

Nokia Customer Care

Service Manual

RM-578; RM-579 (Nokia 2730 classic)

Mobile Terminal

Part No: 9217208 (Issue 3)

COMPANY CONFIDENTIAL



Amendment Record Sheet

Amendment No	Date	Inserted By	Comments
Original issue	07/2009	Jeff Zhao	
Issue 2	07/2009	Jeff Zhao	1. Technical Description for BTHFMTXRDS3.0b added; 2. Bluetooth and FM radio troubleshooting updated.
Issue 3	09/2009	Jeff Zhao	Information of WCDMA troubleshooting added.

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The availability of particular products may vary by region.

IMPORTANT

This document is intended for use by qualified service personnel only.

Warnings and cautions

Warnings

- IF THE DEVICE CAN BE INSTALLED IN A VEHICLE, CARE MUST BE TAKEN ON INSTALLATION IN VEHICLES FITTED WITH ELECTRONIC ENGINE MANAGEMENT SYSTEMS AND ANTI-SKID BRAKING SYSTEMS. UNDER CERTAIN FAULT CONDITIONS, EMITTED RF ENERGY CAN AFFECT THEIR OPERATION. IF NECESSARY, CONSULT THE VEHICLE DEALER/MANUFACTURER TO DETERMINE THE IMMUNITY OF VEHICLE ELECTRONIC SYSTEMS TO RF ENERGY.
- THE PRODUCT MUST NOT BE OPERATED IN AREAS LIKELY TO CONTAIN POTENTIALLY EXPLOSIVE ATMOSPHERES, FOR EXAMPLE, PETROL STATIONS (SERVICE STATIONS), BLASTING AREAS ETC.
- OPERATION OF ANY RADIO TRANSMITTING EQUIPMENT, INCLUDING CELLULAR TELEPHONES, MAY INTERFERE WITH THE FUNCTIONALITY OF INADEQUATELY PROTECTED MEDICAL DEVICES. CONSULT A PHYSICIAN OR THE MANUFACTURER OF THE MEDICAL DEVICE IF YOU HAVE ANY QUESTIONS. OTHER ELECTRONIC EQUIPMENT MAY ALSO BE SUBJECT TO INTERFERENCE.
- BEFORE MAKING ANY TEST CONNECTIONS, MAKE SURE YOU HAVE SWITCHED OFF ALL EQUIPMENT.

Cautions

- Servicing and alignment must be undertaken by qualified personnel only.
- Ensure all work is carried out at an anti-static workstation and that an anti-static wrist strap is worn.
- Ensure solder, wire, or foreign matter does not enter the telephone as damage may result.
- Use only approved components as specified in the parts list.
- Ensure all components, modules, screws and insulators are correctly re-fitted after servicing and alignment.
- Ensure all cables and wires are repositioned correctly.
- Never test a mobile phone WCDMA transmitter with full Tx power, if there is no possibility to perform the measurements in a good performance RF-shielded room. Even low power WCDMA transmitters may disturb nearby WCDMA networks and cause problems to 3G cellular phone communication in a wide area.
- During testing never activate the GSM or WCDMA transmitter without a proper antenna load, otherwise GSM or WCDMA PA may be damaged.

For your safety

QUALIFIED SERVICE

Only qualified personnel may install or repair phone equipment.

ACCESSORIES AND BATTERIES

Use only approved accessories and batteries. Do not connect incompatible products.

CONNECTING TO OTHER DEVICES

When connecting to any other device, read its user's guide for detailed safety instructions. Do not connect incompatible products.

Care and maintenance

This product is of superior design and craftsmanship and should be treated with care. The suggestions below will help you to fulfil any warranty obligations and to enjoy this product for many years.

- Keep the phone and all its parts and accessories out of the reach of small children.
- Keep the phone dry. Precipitation, humidity and all types of liquids or moisture can contain minerals that will corrode electronic circuits.
- Do not use or store the phone in dusty, dirty areas. Its moving parts can be damaged.
- Do not store the phone in hot areas. High temperatures can shorten the life of electronic devices, damage batteries, and warp or melt certain plastics.
- Do not store the phone in cold areas. When it warms up (to its normal temperature), moisture can form inside, which may damage electronic circuit boards.
- Do not drop, knock or shake the phone. Rough handling can break internal circuit boards.
- Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the phone.
- Do not paint the phone. Paint can clog the moving parts and prevent proper operation.
- Use only the supplied or an approved replacement antenna. Unauthorised antennas, modifications or attachments could damage the phone and may violate regulations governing radio devices.

All of the above suggestions apply equally to the product, battery, charger or any accessory.

ESD protection

Nokia requires that service points have sufficient ESD protection (against static electricity) when servicing the phone.

Any product of which the covers are removed must be handled with ESD protection. The SIM card can be replaced without ESD protection if the product is otherwise ready for use.

To replace the covers ESD protection must be applied.

All electronic parts of the product are susceptible to ESD. Resistors, too, can be damaged by static electricity discharge.

All ESD sensitive parts must be packed in metallized protective bags during shipping and handling outside any ESD Protected Area (EPA).

Every repair action involving opening the product or handling the product components must be done under ESD protection.

ESD protected spare part packages **MUST NOT** be opened/closed out of an ESD Protected Area.

For more information and local requirements about ESD protection and ESD Protected Area, contact your local Nokia After Market Services representative.

Battery information

Note: A new battery's full performance is achieved only after two or three complete charge and discharge cycles!

The battery can be charged and discharged hundreds of times but it will eventually wear out. When the operating time (talk-time and standby time) is noticeably shorter than normal, it is time to buy a new battery.

Use only batteries approved by the phone manufacturer and recharge the battery only with the chargers approved by the manufacturer. Unplug the charger when not in use. Do not leave the battery connected to a charger for longer than a week, since overcharging may shorten its lifetime. If left unused a fully charged battery will discharge itself over time.

Temperature extremes can affect the ability of your battery to charge.

For good operation times with Ni-Cd/NiMH batteries, discharge the battery from time to time by leaving the product switched on until it turns itself off (or by using the battery discharge facility of any approved accessory available for the product). Do not attempt to discharge the battery by any other means.

Use the battery only for its intended purpose.

Never use any charger or battery which is damaged.

Do not short-circuit the battery. Accidental short-circuiting can occur when a metallic object (coin, clip or pen) causes direct connection of the + and - terminals of the battery (metal strips on the battery) for example when you carry a spare battery in your pocket or purse. Short-circuiting the terminals may damage the battery or the connecting object.

Leaving the battery in hot or cold places, such as in a closed car in summer or winter conditions, will reduce the capacity and lifetime of the battery. Always try to keep the battery between 15°C and 25°C (59°F and 77°F). A phone with a hot or cold battery may temporarily not work, even when the battery is fully charged. Batteries' performance is particularly limited in temperatures well below freezing.

Do not dispose of batteries in a fire!

Dispose of batteries according to local regulations (e.g. recycling). Do not dispose as household waste.

Company policy

Our policy is of continuous development; details of all technical modifications will be included with service bulletins.

While every endeavour has been made to ensure the accuracy of this document, some errors may exist. If any errors are found by the reader, NOKIA MOBILE PHONES Business Group should be notified in writing/e-mail.

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Nokia 2730 classic Service Manual Structure

- 1 General information
- 2 Service Devices and Service Concepts
- 3 BB Troubleshooting and Manual Tuning Guide
- 4 RF troubleshooting
- 5 System Module
- Glossary

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Nokia Customer Care

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■ Product selection

Product	GSM quad-band (1800/1900/900/850) UMTS band I, VIII; WCDMA 2100/900	GSM quad-band (1800/1900/900/850) UMTS band II, V (including VI); WCDMA 1900/850
Type Designator	RM-578	RM-579
Nickname	Tommy	Tommy
TA Model Number	<ul style="list-style-type: none">• 2730c-1• 2730c (China mainland)	<ul style="list-style-type: none">• 2730c-1b
Marketing Name	<ul style="list-style-type: none">• 2730c classic• 2730c (China mainland)	<ul style="list-style-type: none">• 2730 classic



Figure 1 RM-578/579 (Nokia 2730c) product picture

■ Phone features

Display and keypad features

- 2" 240x320 pixel, 262k true colour display
- 5-way , navi-key (2 soft-keys, call and end keys)

Hardware features

- 2-megapixel camera with 4x digital zoom
- 3.5mm AV connector for stereo headset
- Micro USB port for data transfer (USB 2.0)

- Bluetooth (version 3.0)
- RDS Stereo radio and music player
- Internal vibrator and antenna
- Plug-in SIM (1.8 V and 3.0 V)
- MicroSD card hot swap slot (up to 4GB)

RF features

- GSM850/900/1800/1900; WCDMA850/900/1900/2100
- EGPRS: MSC 32 (MSC 31 in China)
- GPRS: MSC 32 (MSC 31 in China)
- HSCDS
- CSD

■ User interface and software features

Selection of software applications and services

- Audio messages
- XHTML browsing over TCP/IP
- Themes (wallpapers, icons, colors)
- Music Player supporting MP3, AAC, ACC+, eAAC+ and WMA
- Nokia Xpress audio messaging (AMS)
- OMA DRM 2.0 (Digital Right Management)
- OMA MMS 1.2, MMS Conformance 3.0, AMR and SMIL
- OMA Client Provisioning v1.1
- Java
- MP3 ringing tones, true tones and MIDI ringing, alert and gaming tones with support of 64 polyphony
- Video ringing tones
- WAP 2.0, XHTML browser over HTTP/TCP/IP stack
- SyncML (local and remote)
- TWIN PC Suite

■ Accessories

Sales package contents

- Nokia 2730c phone
- Nokia Battery BL-5C
- Nokia Charger: AC-3
(AC-8C and CA-100C for PRC)
- 1GB micro SD memory card (area dependent)
- Nokia wired stereo headset: WH-102
- User Guide

Table 1 Battery and chargers

Type	Name
Note: This phone is charged through the smaller charger Nokia standard interface (2.mm plug). The standard 3.5mm standard charger can be used together with the CA-44 charger adapter.	
AC-3	Charger
BL-5C	Battery 1020 mAh Li-Ion

Table 2 Headsets

Type	Name
WH-102	Stereo headset (wired)
BH-103	Bluetooth stereo headset
BH-214	Bluetooth headset
WH-500	Stereo headset

Table 3 Data cables

Type	Name
CA-101	Micro USB cable

■ Technical specifications

General specifications

Unit	Dimension (mm)	Weight (g)	Volume (cc)
Transceiver with BL-5C 1020 mAh Li-Ion battery pack	109.6X46.9X14.4	88	65

Battery endurance

Battery	Capacity mAh		Best Talk Time	Best Standby Time
BL-5C	1020	GSM	10h 28min	446h 23 min
		WCDMA	3h 24min	433h 40min
			ECTEL Talk Time	ECTEL Standby Time
		GSM	4h 10min	370h 20min
		WCDMA	3h 10min	380h 40min

Note: Variation in operation times will occur depending on SIM card, network settings and usage.

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2 — Service Devices and Service Concepts

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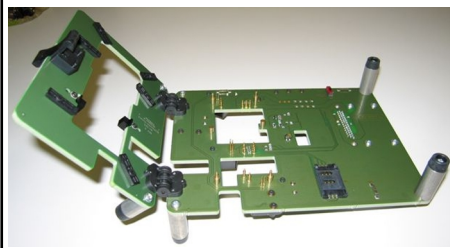
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■ Service devices

Product specific devices

The table below gives a short overview of service devices that can be used for testing, error analysis, and repair of product RM-578; RM-579. For the correct use of the service devices, and the best effort of workbench setup, please refer to various concepts.

	FS-132	Flash adapter	
	<ul style="list-style-type: none">• FS-132 is equipped with a clip interlock system• provides standardised interface towards Control Unit• provides RF connection using coupler• multiplexing between USB and FBUS media, controlled by VUSB		



MJ-253	Module jig	
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MJ-253 is meant for component level troubleshooting.
The jig includes an RF interface for GSM and Bluetooth. In addition, it has the following features:



- Provides mechanical interface with the engine module
- Provides galvanic connection to all needed test pads in module
- Multiplexing between USB and FBUS media, controlled by Vusb
- MMC interface
- Duplicated SIM connector
- Connector for control unit
- Access for AV- and USB connectors



Band	default f/ MHz RX	Attenuatio n RX	default f/ MHz TX	Attenuatio n TX
GSM 850	881.6	0.20	836.6	0.15
GSM 900	942.4	0.20	897.4	0.15
GSM 1800	1842.8	0.30	1747.8	0.25
GSM 1900	1960.0	0.30	1880.0	0.30
WCDMA I	2140.0	0.35	1950.0	0.30
WCDMA II	1960.0	0.30	1880.0	0.30
WCDMA III	1842.4	0.30	1747.4	0.25
WCDMA IV	2140.0	0.40	1740.0	0.25
WCDMA V	880.0	0.20	835.0	0.15
WCDMA VI	880.0	0.2	835.0	0.15
WCDMA VII	2655.0		2535.0	
WCDMA VIII	942.6	0.20	897.6	0.20
WCDMA IX	1862.4	0.30	1767.4	0.25
WLAN	n / a	n / a	2442.0	0.40
FM / Tx	n / a	n / a		

General devices

The table below gives a short overview of service devices that can be used for testing, error analysis, and repair of product RM-578; RM-579. For the correct use of the service devices, and the best effort of workbench setup, please refer to various concepts.

<p>CU-4</p> 	<p>CU-4</p>	<p>Control unit</p>	<p>CU-4 is a general service tool used with a module jig and/or a flash adapter. It requires an external 12 V power supply.</p> <p>The unit has the following features:</p> <ul style="list-style-type: none"> • software controlled via USB • EM calibration function • Forwards FBUS/Flashbus traffic to/from terminal • Forwards USB traffic to/from terminal • software controlled BSI values • regulated VBATT voltage • 2 x USB2.0 connector (Hub) • FBUS and USB connections supported <p>When using CU-4, note the special order of connecting cables and other service equipment:</p> <p>Instructions</p> <ol style="list-style-type: none"> 1 Connect a service tool (jig, flash adapter) to CU-4. 2 Connect CU-4 to your PC with a USB cable. 3 Connect supply voltage (12 V) 4 Connect an FBUS cable (if necessary). 5 Start Phoenix service software.  <p>Note: Phoenix enables CU-4 regulators via USB when it is started.</p> <p>Reconnecting the power supply requires a Phoenix restart.</p>
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	FLS-5	Flash device	
	FPS-10	Flash prommer	
	<p>FLS-5 is a dongle and flash device incorporated into one package, developed specifically for POS use.</p> <p>Note: FLS-5 can be used as an alternative to PKD-1.</p> <p>FPS-10 interfaces with:</p> <ul style="list-style-type: none"> • PC • Control unit • Flash adapter • Smart card <p>FPS-10 flash prommer features:</p> <ul style="list-style-type: none"> • Flash functionality for BB5 and DCT-4 terminals • Smart Card reader for SX-2 or SX-4 • USB traffic forwarding • USB to FBUS/Flashbus conversion • LAN to FBUS/Flashbus and USB conversion • Vusb output switchable by PC command <p>FPS-10 sales package includes:</p> <ul style="list-style-type: none"> • FPS-10 prommer • Power Supply with 5 country specific cords • USB cable <p>Note: FPS-21 is substitute FPS-10 if FPS-10 has not been set up.</p>		

<div data-bbox="140 215 280 264" data-label="Section-Header"> <h2>FPS-21</h2> </div> 	FPS-21	Flash prommer	
	PK-1	Software protection key	<p>PK-1 is a hardware protection key with a USB interface. It has the same functionality as the PKD-1 series dongle.</p> <p>PK-1 is meant for use with a PC that does not have a series interface.</p> <p>To use this USB dongle for security service functions please register the dongle in the same way as the PKD-1 series dongle.</p>

FPS-21 sales package:

- FPS-21 prommer
- AC-35 power supply
- CA-31D USB cable

FPS-21 interfaces:

Front

- Service cable connector
Provides Flashbus, USB and VBAT connections to a mobile device.
- SmartCard socket
A SmartCard is needed to allow DCT-4 generation mobile device programming.



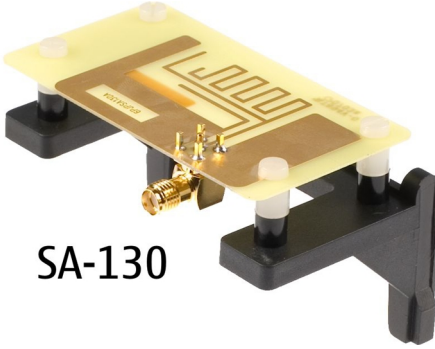



Rear






- DC power input
For connecting the external power supply (AC-35).
- Two USB A type ports (USB1/USB3)
Can be used, for example, for connecting external storage memory devices or mobile devices
- One USB B type device connector (USB2)
For connecting a PC.
- Phone connector
Service cable connection for connecting Flashbus/FLA.
- Ethernet RJ45 type socket (LAN)
For connecting the FPS-21 to LAN.


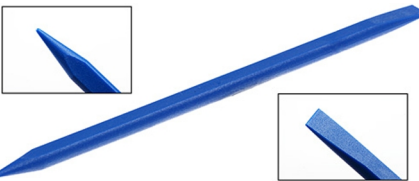

Inside

- Four SD card memory slots
For internal storage memory.

Note: In order to access the SD memory card slots inside FPS-21, the prommer needs to be opened by removing the front panel, rear panel and heatsink from the prommer body.


	PKD-1	SW security device	
	<p>SW security device is a piece of hardware enabling the use of the service software when connected to the parallel (LPT) port of the PC. Without the device, it is not possible to use the service software. Printer or any such device can be connected to the PC through the device if needed.</p>		
	RJ-230	Common jig	
	<p>RJ-230 is a jig used for soldering and as a rework jig for the engine module.</p>		
	SA-130	RF coupler	
<p>SA-130 is an RF coupler for GSM RF testing. It is used together with SS-46 and SS-62.</p>			
	SB-6	Bluetooth tester	
	<p>The SB-6 test box is a generic device to perform Bluetooth bit error rate testing and doing cordless FBUS connection via Bluetooth.</p>		
	SPS-2	Soldering paste spreader	
<p>Note: Existing solder paste stencils and component holder jigs will be supported until January 2009. For all new parts needing solder paste support after January 1, 2009, please contact your solder machine manufacturer for the universal solutions for solder paste application for rework purposes.</p>			




	SRT-6	Opening tool	
	SRT-6 is used to open phone covers. Note: The SRT-6 is included in the Nokia Standard Toolkit.		
	SS-108	Peeling tool	
	The peeling tool SS-108 is used to peel off the shielding.		
	SS-203	Domesheet alignment jig	
	SS-203 is used for aligning domesheet to PWB.		
	SS-46	Interface adapter	
	SS-46 acts as an interface adapter between the flash adapter and FPS-21.		
	SS-62	Generic flash adapter base for BB5	
	<ul style="list-style-type: none"> • generic base for flash adapters and couplers • SS-62 equipped with a clip interlock system • provides standardised interface towards Control Unit • provides RF connection using galvanic connector or coupler • multiplexing between USB and FBUS media, controlled by VUSB 		




	SS-88	Camera removal tool	
	The camera removal tool SS-88 is used to remove/attach the camera module from/to the socket.		
	SS-93	Blue stick tool	
	SS-93 is used for general disassembly and assembly tasks.		
	SX-4	Smart card	
	<p>SX-4 is a BB5 security device used to protect critical features in tuning and testing.</p> <p>SX-4 is also needed together with FPS-21 when DCT-4 phones are flashed.</p>		

Cables

The table below gives a short overview of service devices that can be used for testing, error analysis, and repair of product RM-578; RM-579. For the correct use of the service devices, and the best effort of workbench setup, please refer to various concepts.

 CA-101 100cm	CA-101	Micro USB cable	
	The CA-101 is a USB-to-microUSB data cable that allows connections between the PC and the phone.		



	CA-112DS	Easy flash II cable	
	CA-35S	Power cable	
 <p>CA-89DS 100cm</p>	CA-89DS	Cable	<p>Provides VBAT and Flashbus connections to mobile device programming adapters.</p>

 <p>CA-99PS 10cm</p>	CA-99PS	Adapter	
	PCS-1	Power cable	
	XCS-4	Modular cable	

CA-99PS adapter, 3.5 jack to 5.5 plug.

The PCS-1 power cable (DC) is used with a docking station, a module jig or a control unit to supply a controlled voltage.

XCS-4 is a shielded (one specially shielded conductor) modular cable for flashing and service purposes.

	XRE-2	Bluetooth cable	
	XRS-6	RF cable	
	<p>The bluetooth cable connects the bluetooth connector of the module jig to the bluetooth test box JBT-9.</p>		
	<p>The RF cable is used to connect, for example, a module repair jig to the RF measurement equipment. SMA to N-Connector approximately 610 mm. Attenuation for:</p> <ul style="list-style-type: none"> • GSM850/900: 0.3+-0.1 dB • GSM1800/1900: 0.5+-0.1 dB • WLAN: 0.6+-0.1dB 		

■ Service concepts

POS (Point of Sale) flash concept

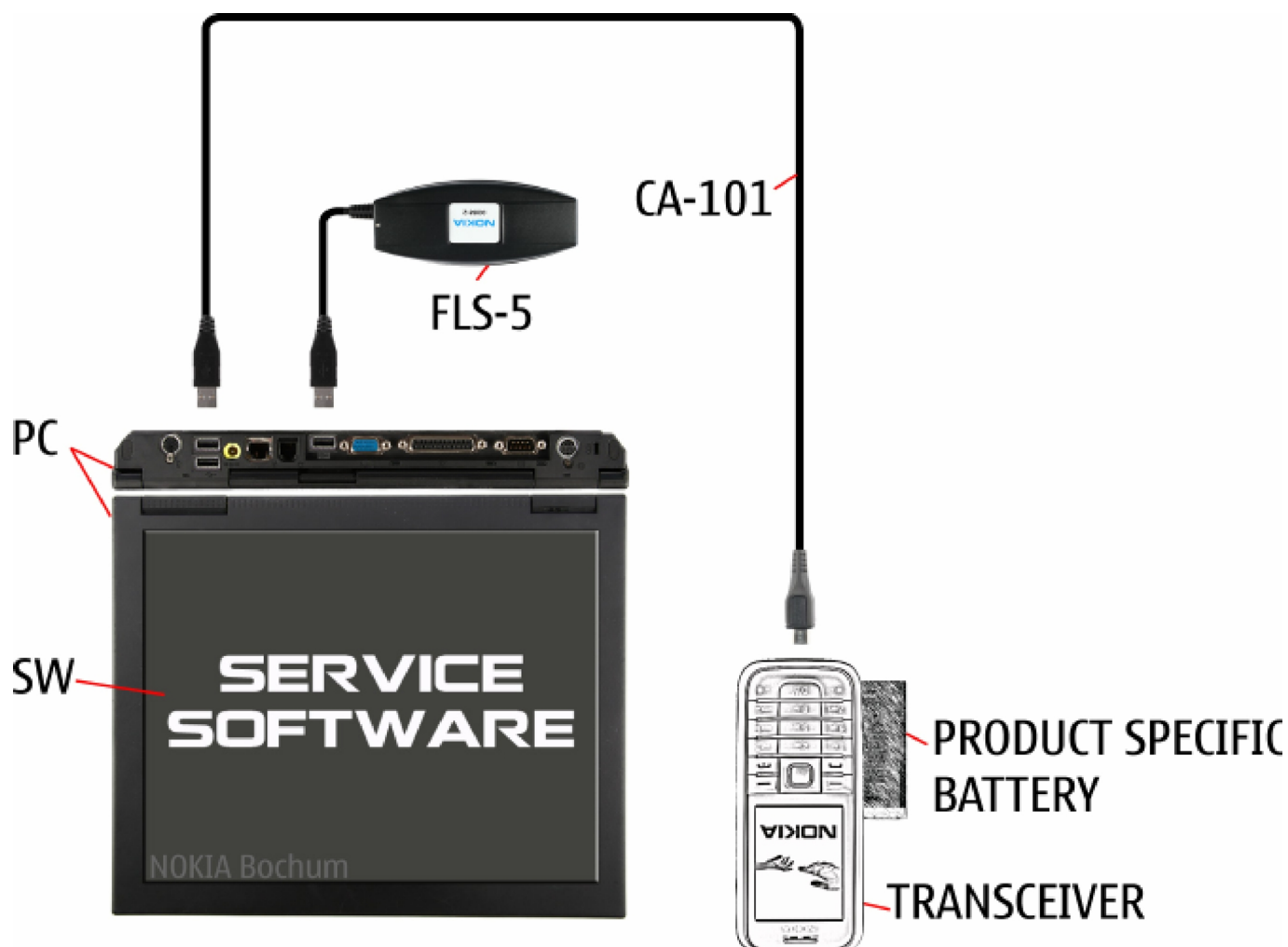


Figure 2 POS flash concept

Type	Description
Product specific tools	
BL-5C	Battery
Other tools	
FLS-5	POS flash dongle
	PC with Phoenix service software
Cables	
CA-101	USB connectivity cable

Flash concept with FPS-10

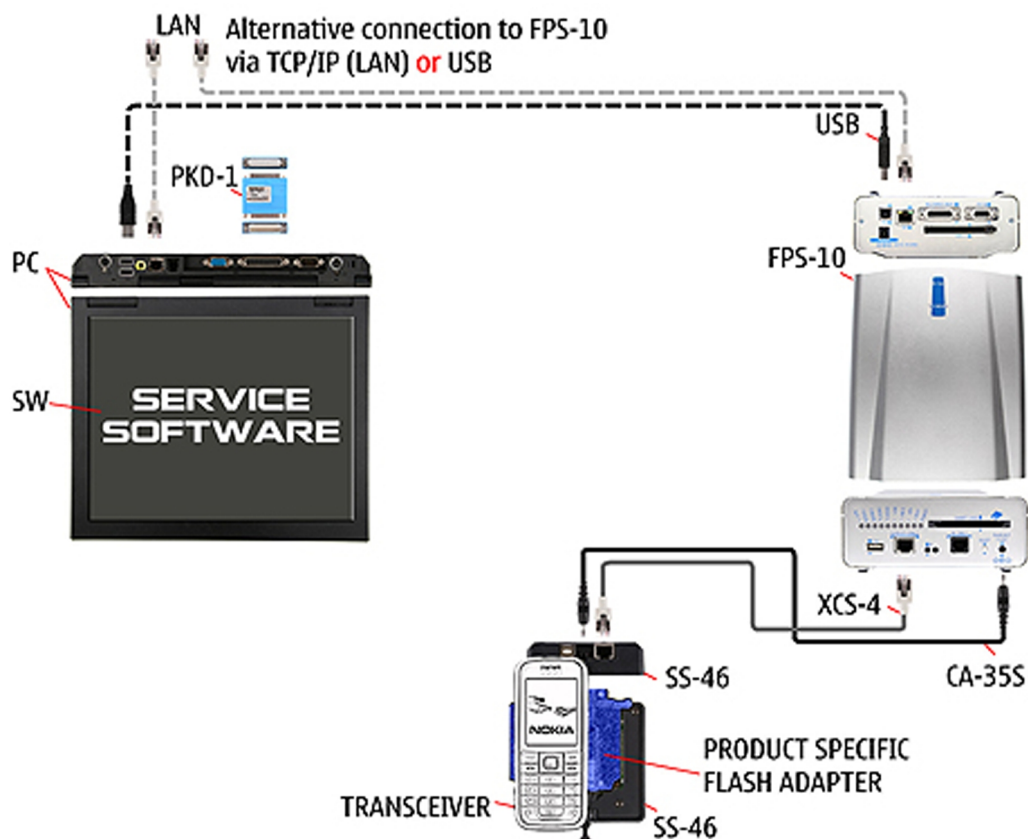


Figure 3 Basic flash concept with FPS-10

Type	Description
Product specific devices	
FS-132	Flash adapter
Other devices	
FPS-10	Flash prommer box
PKD-1/PK-1	SW security device
SS-46	Interface adapter
	PC with Phoenix service software
Cables	
XCS-4	Modular cable
CA-35S	Power cable
	USB cable

CU-4 flash concept with FPS-10

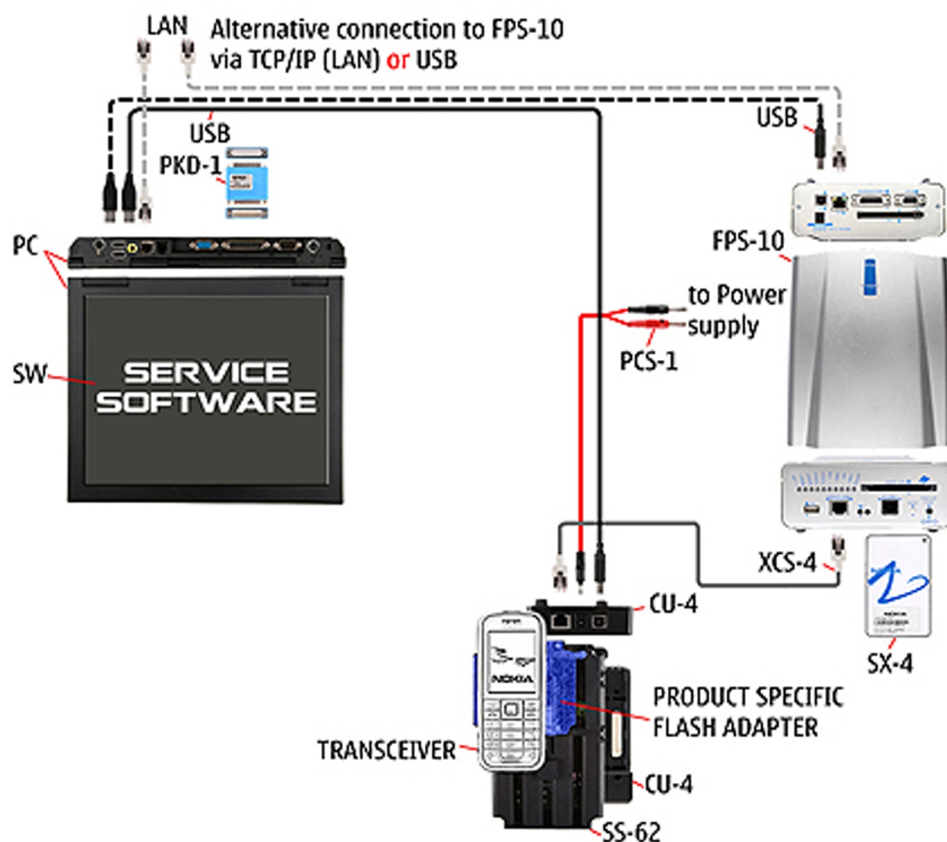


Figure 4 CU-4 flash concept with FPS-10

Type	Description
Product specific devices	
FS-132	Flash adapter
Other devices	
CU-4	Control unit
FPS-10	Flash prommer box
PKD-1/PK-1	SW security device
SS-62	Flash adapter base
SX-4	Smart card
	PC with Phoenix service software
Cables	
PCS-1	Power cable
XCS-4	Modular cable
	Standard USB cable
	USB cable

Module jig service concept

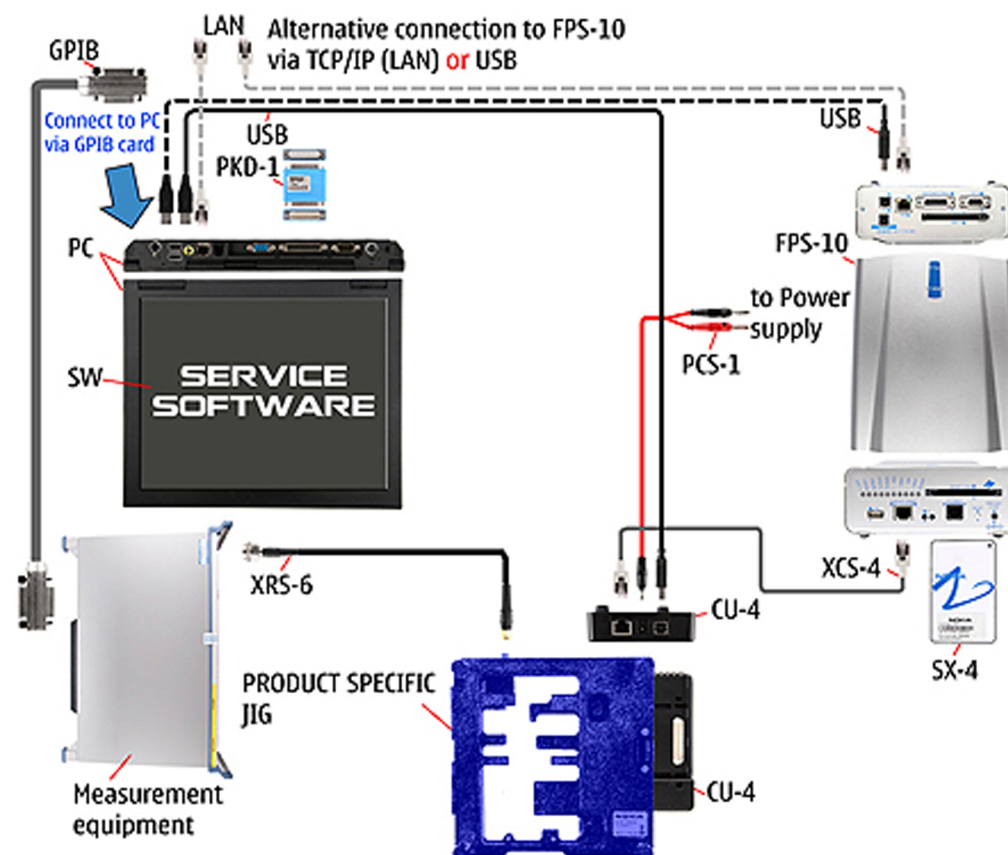


Figure 5 Module jig service concept

Type	Description
Phone specific devices	
MJ-253	Module jig
Other devices	
CU-4	Control unit
FPS-10	Flash prommer box
PK-1	SW security device
SX-4	Smart card
	PC with VPOS and Phoenix service software
	Measurement equipment
Cables	
PCS-1	DC power cable
XCS-4	Modular cable
XRS-6	RF cable
	USB cable

Type	Description
	GPIO control cable

RF testing concept with RF coupler

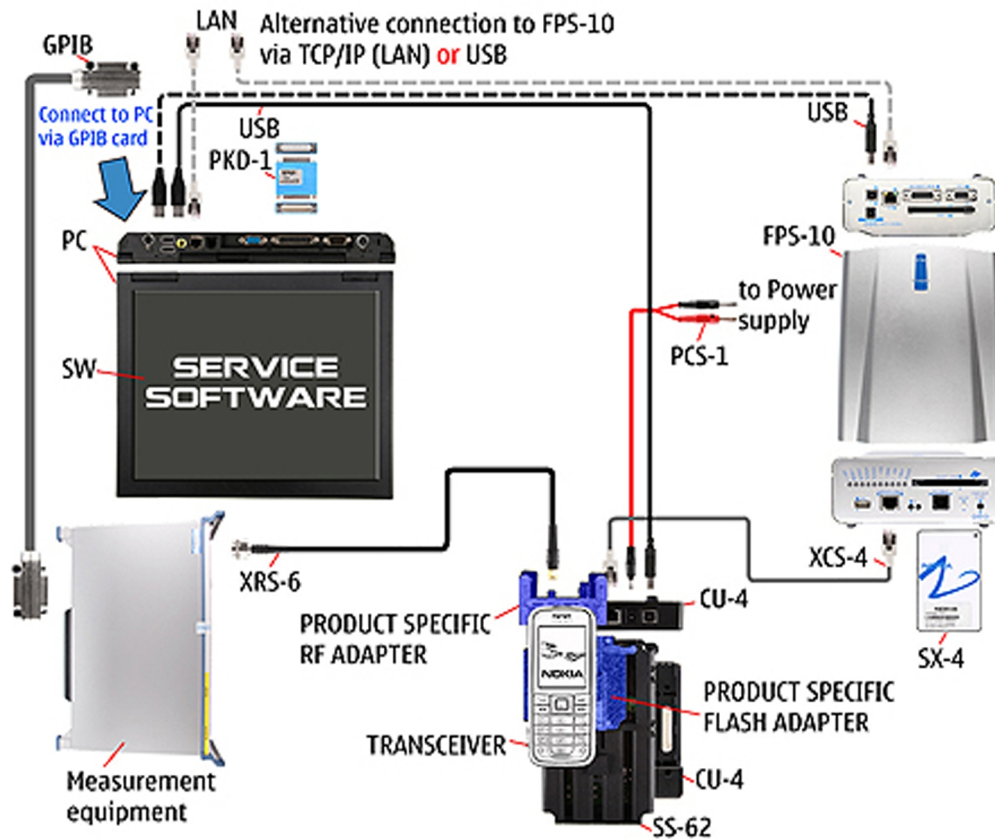


Figure 6 RF testing concept with RF coupler

Type	Description
Product specific devices	
FS-132	Flash adapter
SA-130	RF coupler
Other devices	
CU-4	Control unit
SX-4	Smart card
FPS-10	Flash prommer box
PKD-1/PK-1	SW security device
SS-62	Flash adapter base
	Measurement equipment
	PC with Phoenix service software
Cables	
PCS-1	Power cable

Type	Description
XCS-4	Modular cable
XRS-6	RF cable
	GPIO control cable
	USB cable

BB5 Basic Flash Concept with FPS-21, SS-46

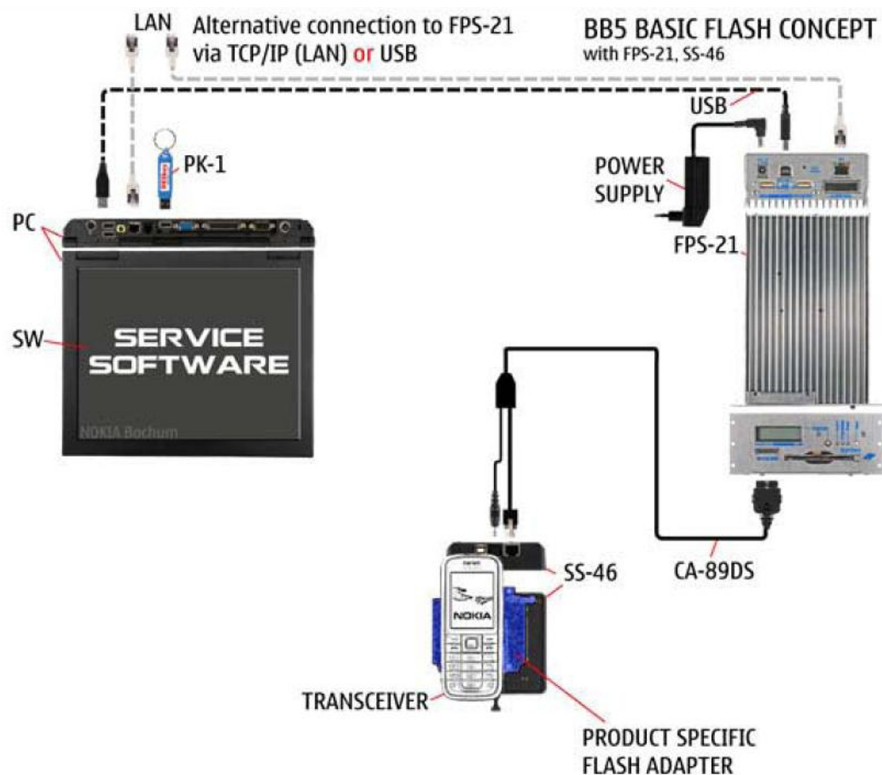


Figure 7 BB5 Basic Flash Concept with FPS-21, SS-46

BB5 Basic Flash Concept with FPS-21, SS-62

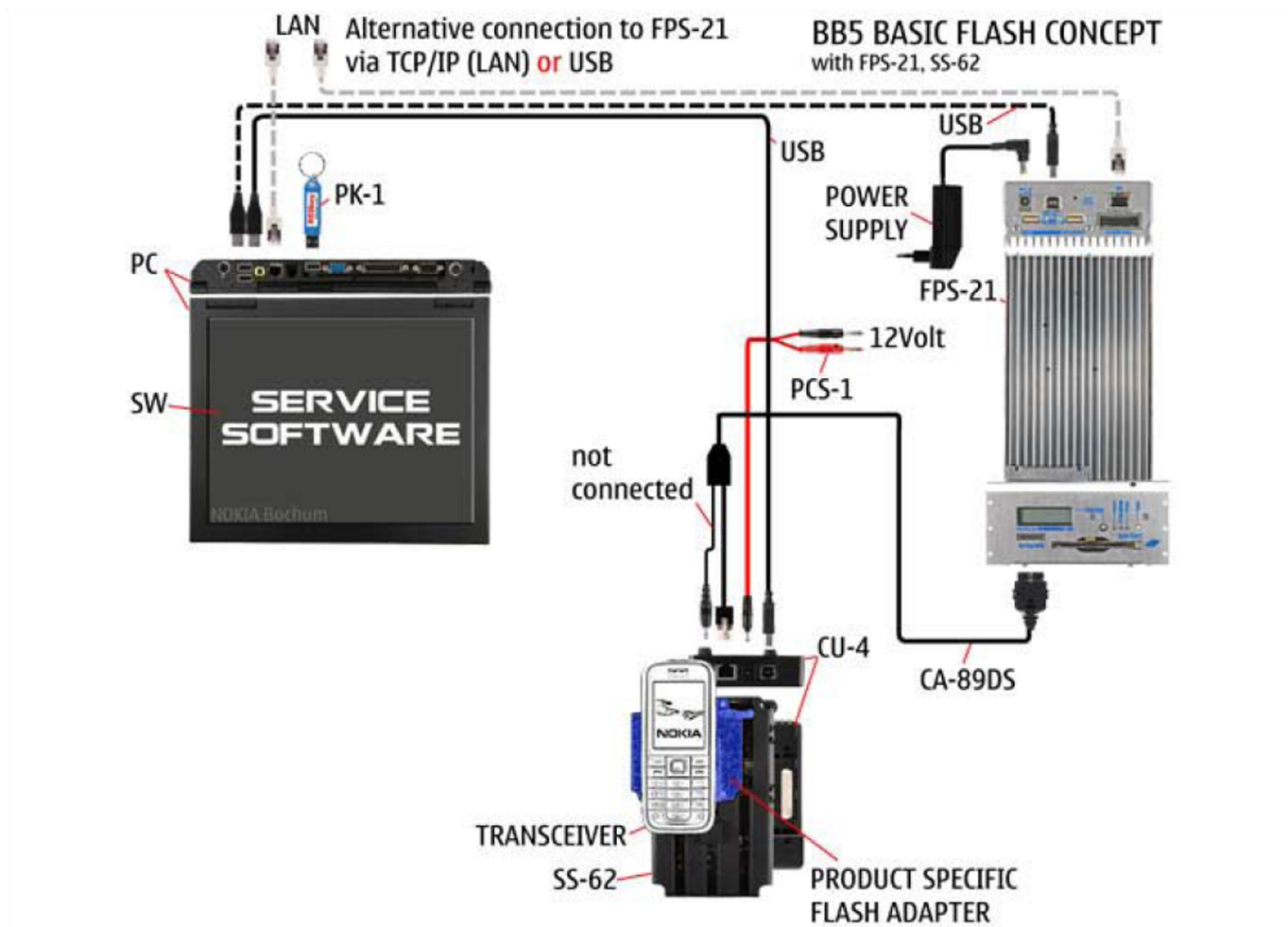


Figure 8 BB5 Basic Flash Concept with FPS-21, SS-62

BB5 Basic RF & BB Tune Concept with FS-132

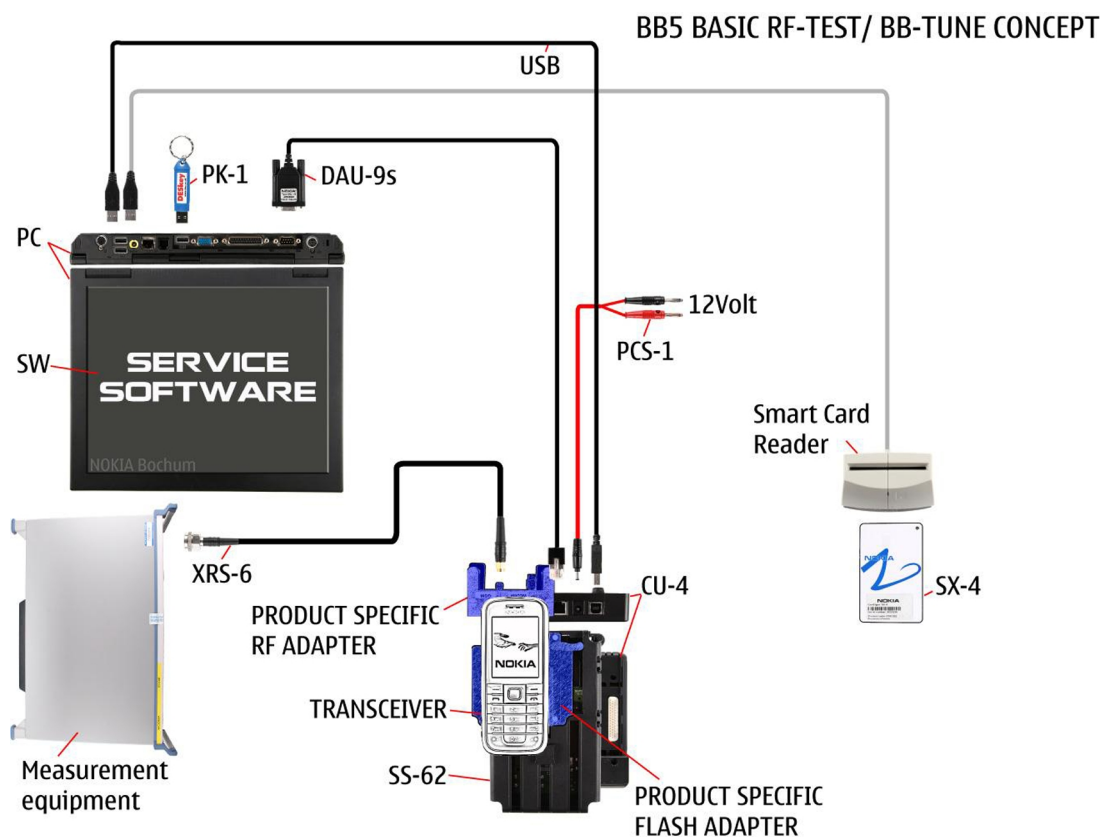


Figure 9 BB5 Basic RF & BB Tune Concept with FS-132

BB5 Basic RF&BB Tune Concept with MJ-253

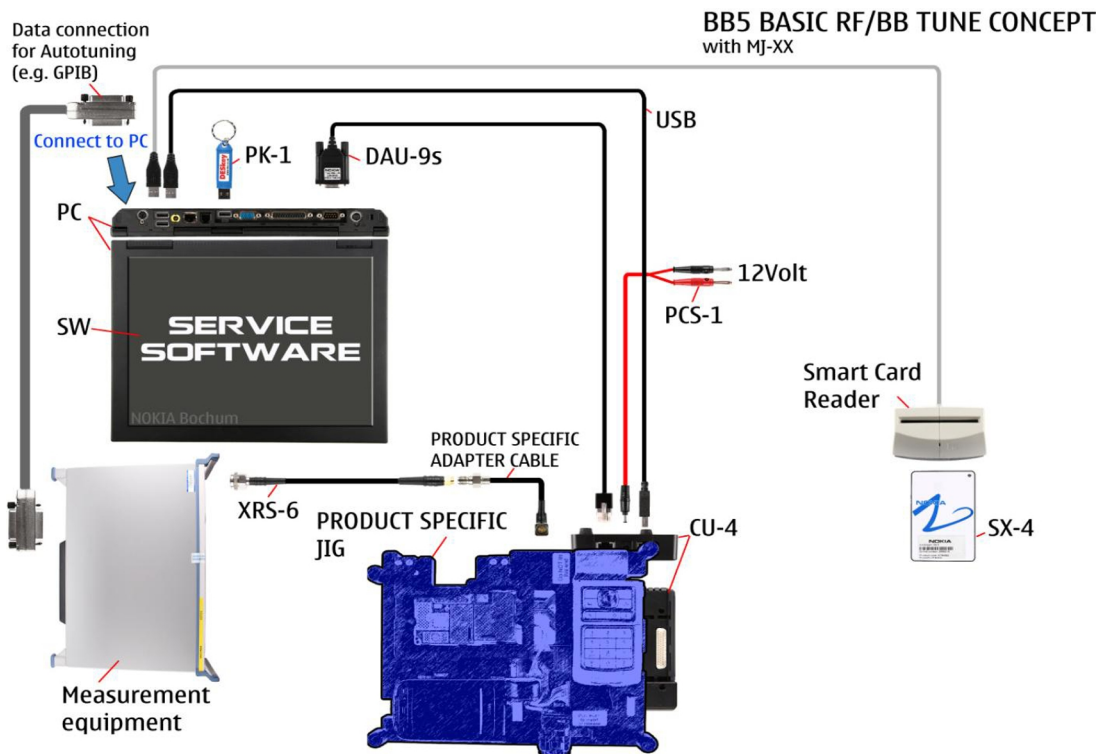


Figure 10 BB5 Basic RF&BB Tune Concept with MJ-253

3 — BB Troubleshooting and Manual Tuning Guide

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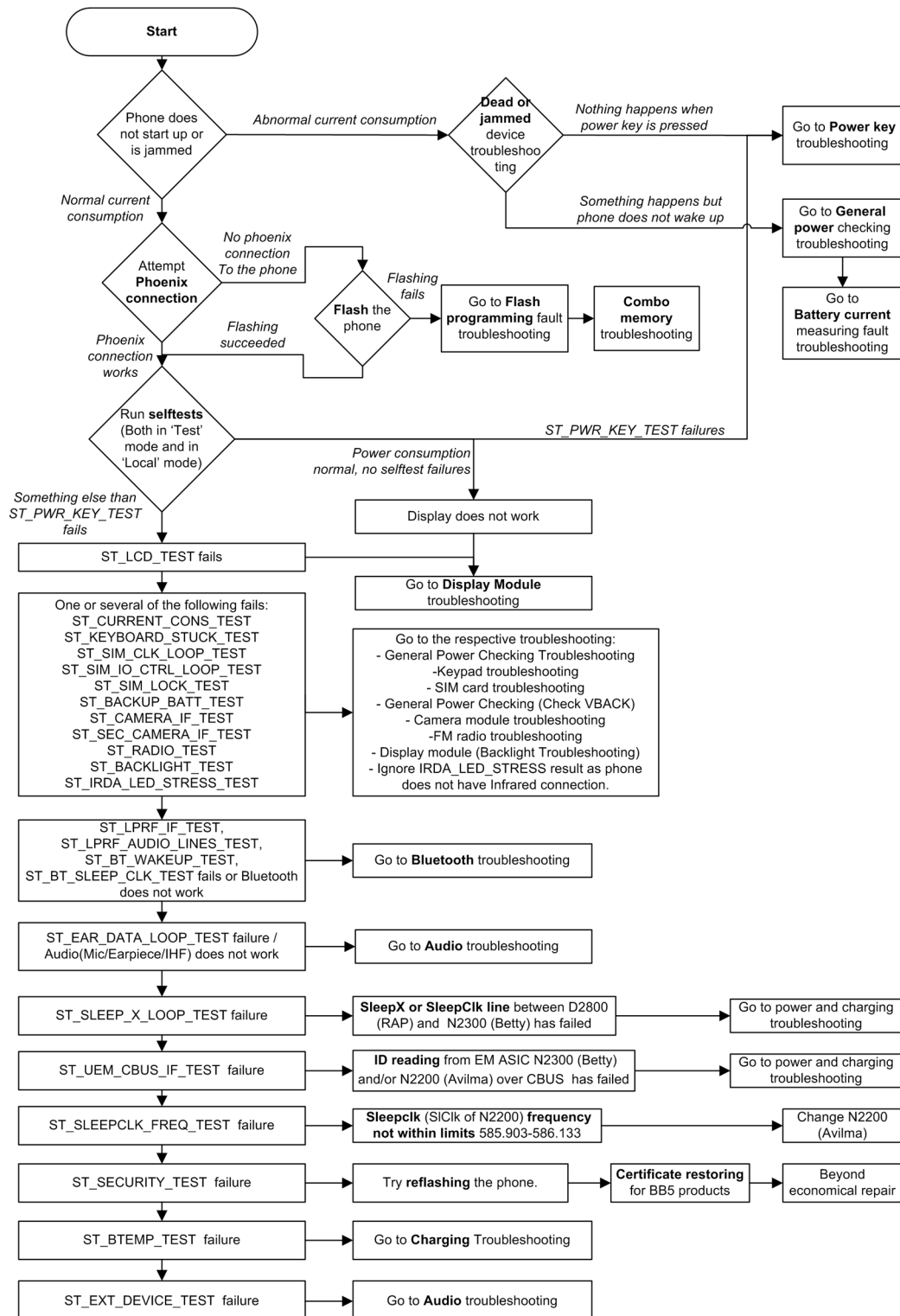
■ Baseband self tests in Phoenix

Context

Always start the troubleshooting procedure by running the Phoenix self tests. If a test fails, please follow the diagram below.

If the phone is dead and you cannot perform the self tests, go to *Dead or jammed device troubleshooting*.

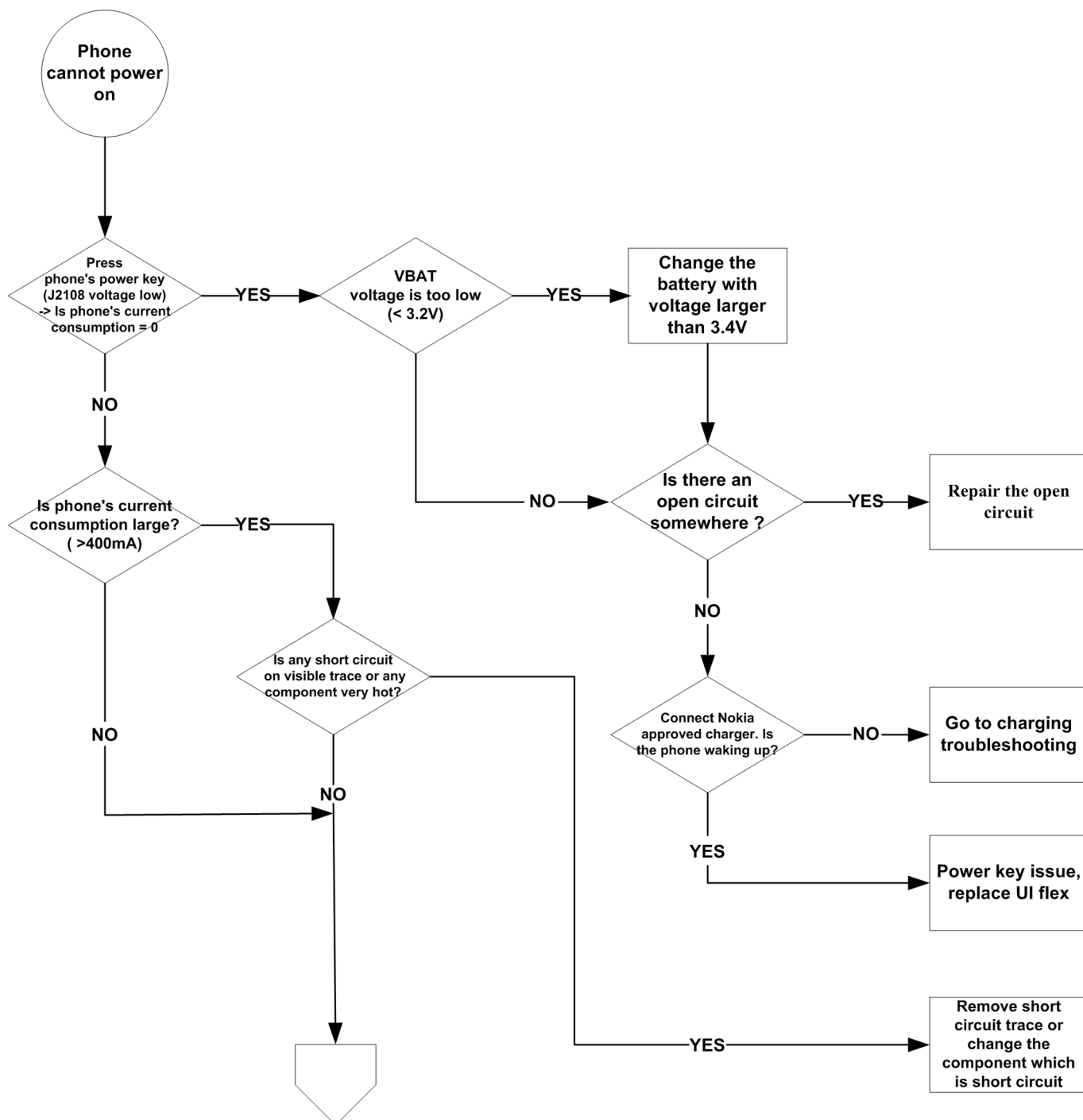
Troubleshooting flow



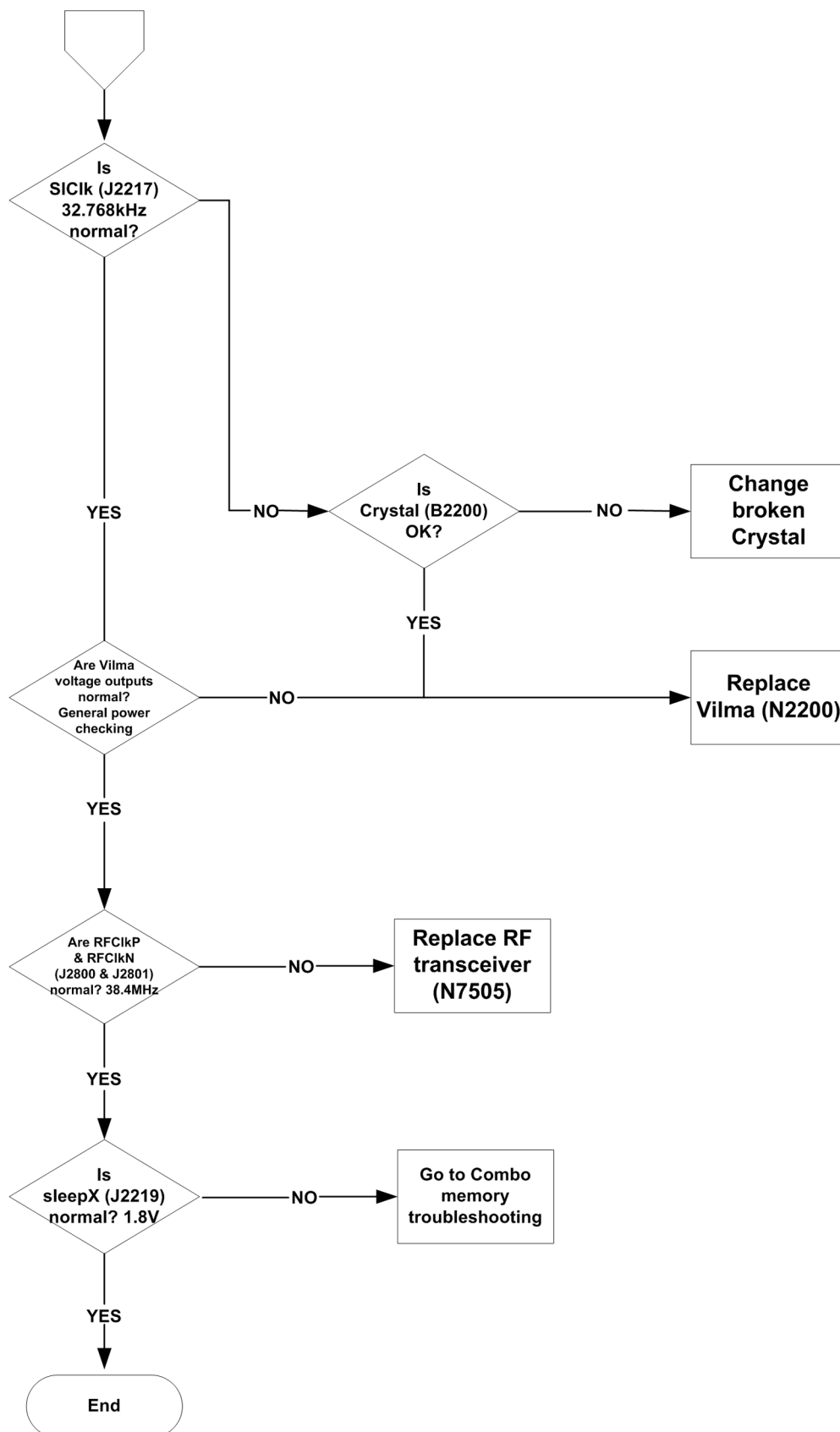
■ Power and charging troubleshooting

Dead or jammed device troubleshooting

Troubleshooting flow



Troubleshooting flow



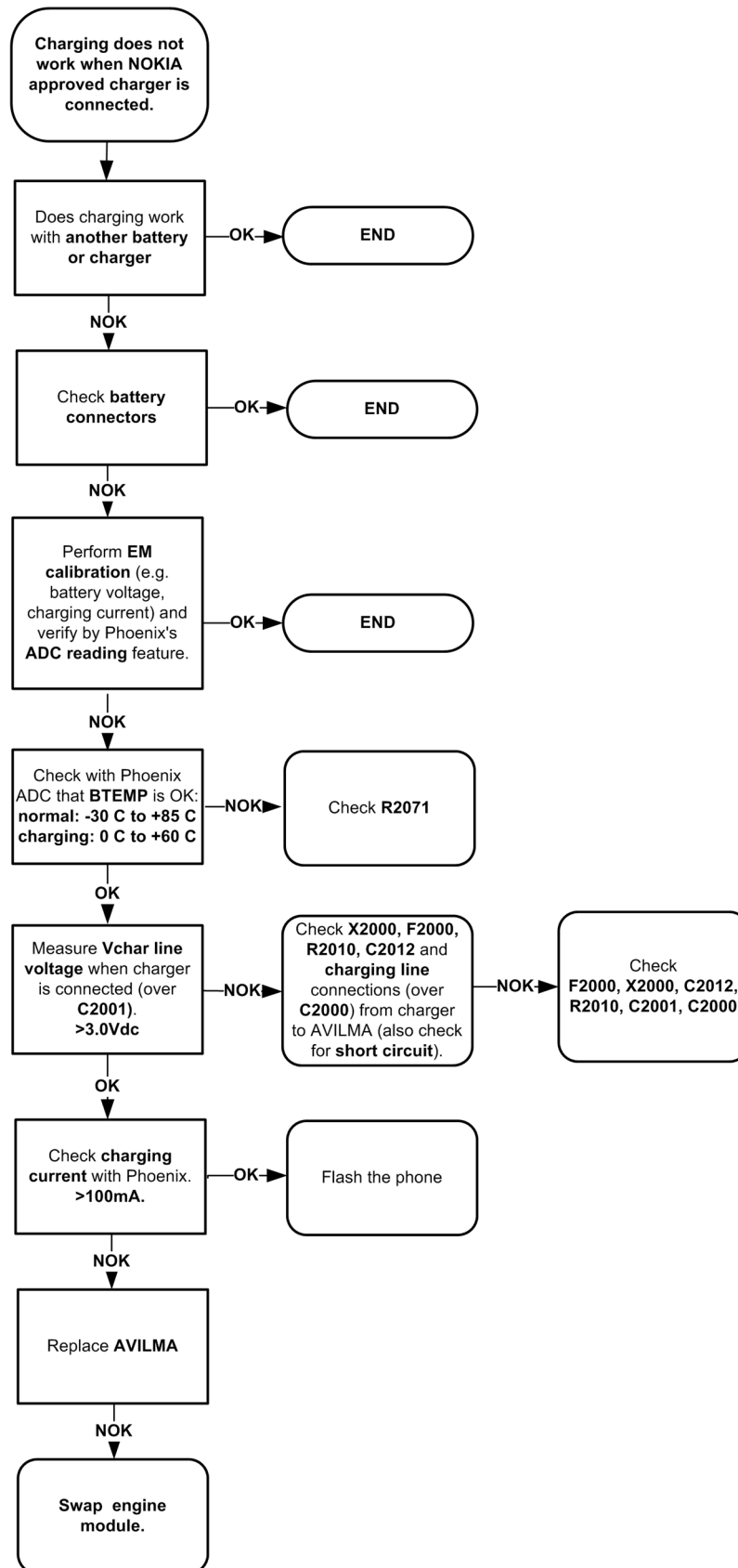
General power checking

Check the following voltages:

Signal name	Regulator	Sleep	Idle	Nominal voltage	Main user	Notes
VIO	AVILMA	ON	ON	1.82	Memory, I/Os, Display	
VBACK	AVILMA	ON	ON	2.5	Back-up battery	
VSIM1	AVILMA	ON	ON	1.8/3.0	SIM card	
VDRAM	AVILMA	ON	ON	1.82	SDRAM	
VAUX	AVILMA	OFF	OFF	2.5	Camera, Display	
VR1	AVILMA	OFF	ON	2.5	Crystal oscillators, RFIC	
VRFC	AVILMA	OFF	ON	1.8	RAPs converters	
VRCP1	AVILMA			4.75	To RF parts	RF active
VREF	AVILMA	ON	ON	1.35	RF reference	
VCORE	BETTY	ON	ON	1.05 1.25 1.35 1.40	Combo memory	
VOUT	BETTY	OFF	OFF	2.5		Accessory connected
VSIM2	AVILMA	OFF	OFF	2.2	Internal microphone	

Charging troubleshooting

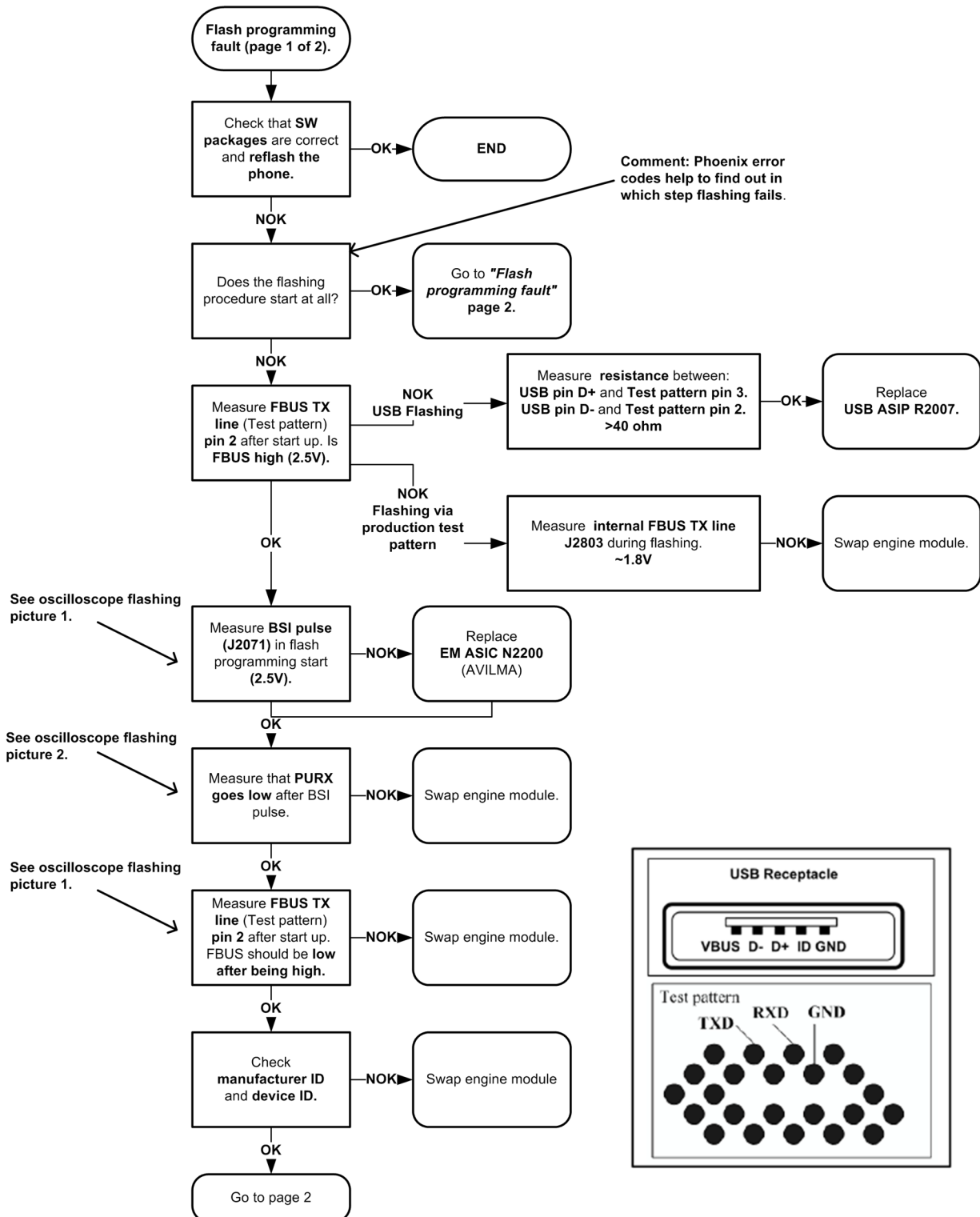
Troubleshooting flow



■ Interface troubleshooting

Flash programming fault troubleshooting

Part 1



Part 2

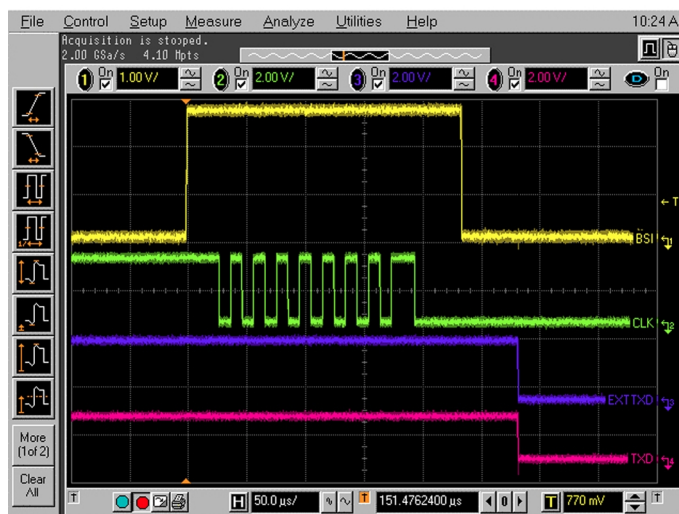
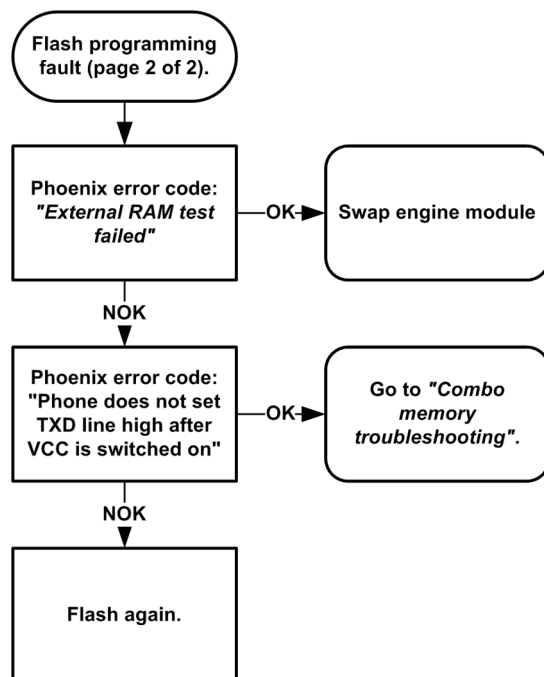


Figure 11 Flashing pic 1. Take single trig measurement for the rise of the BSI signal.

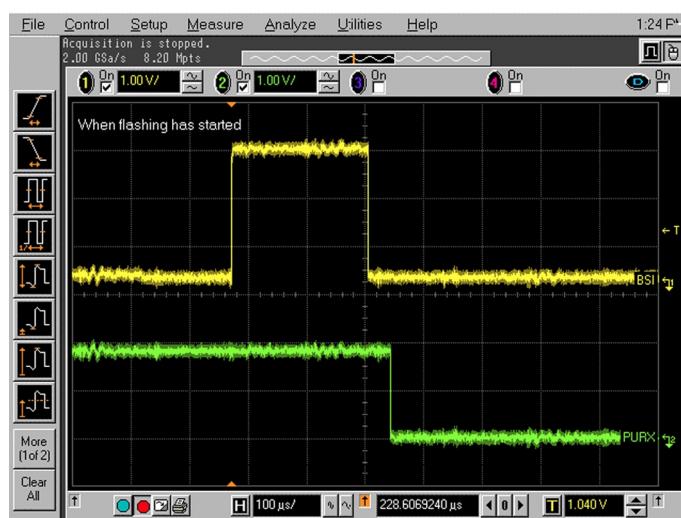
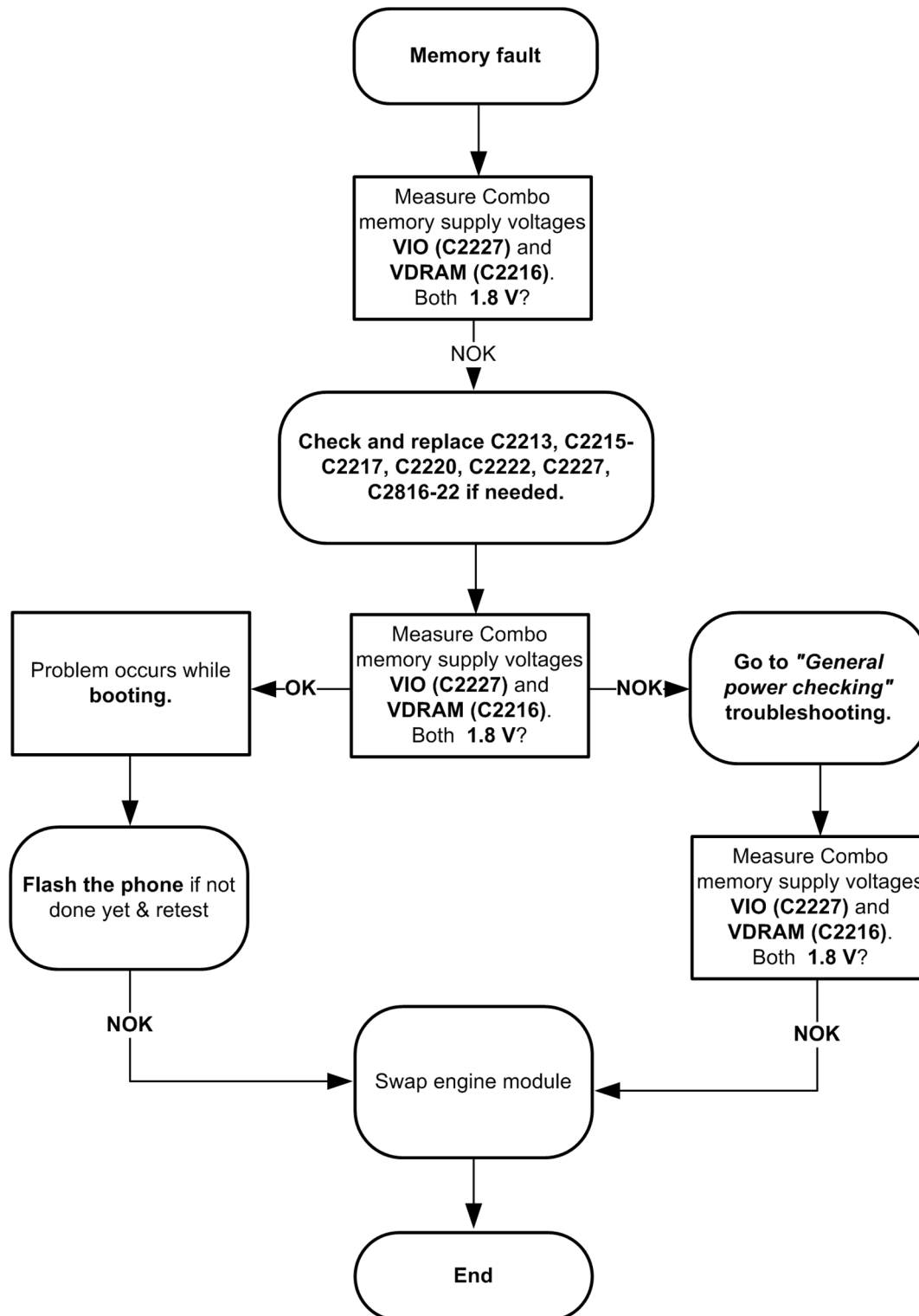


Figure 12 Flashing pic 2. Take single trig measurement for the rise of the BSI signal.

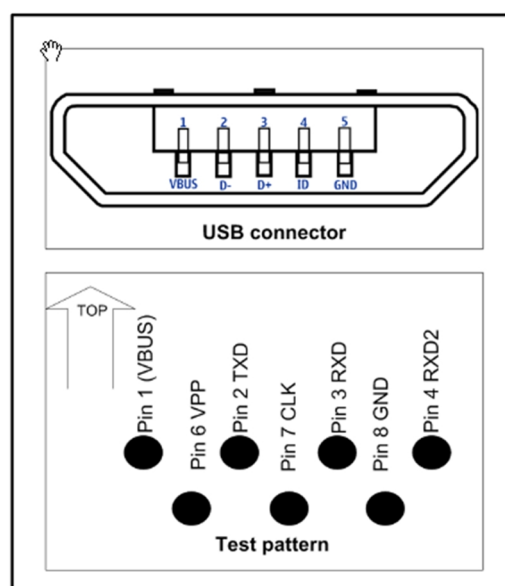
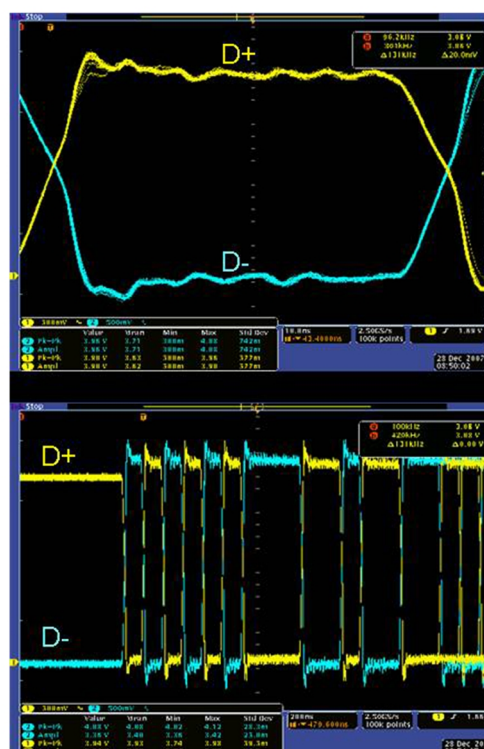
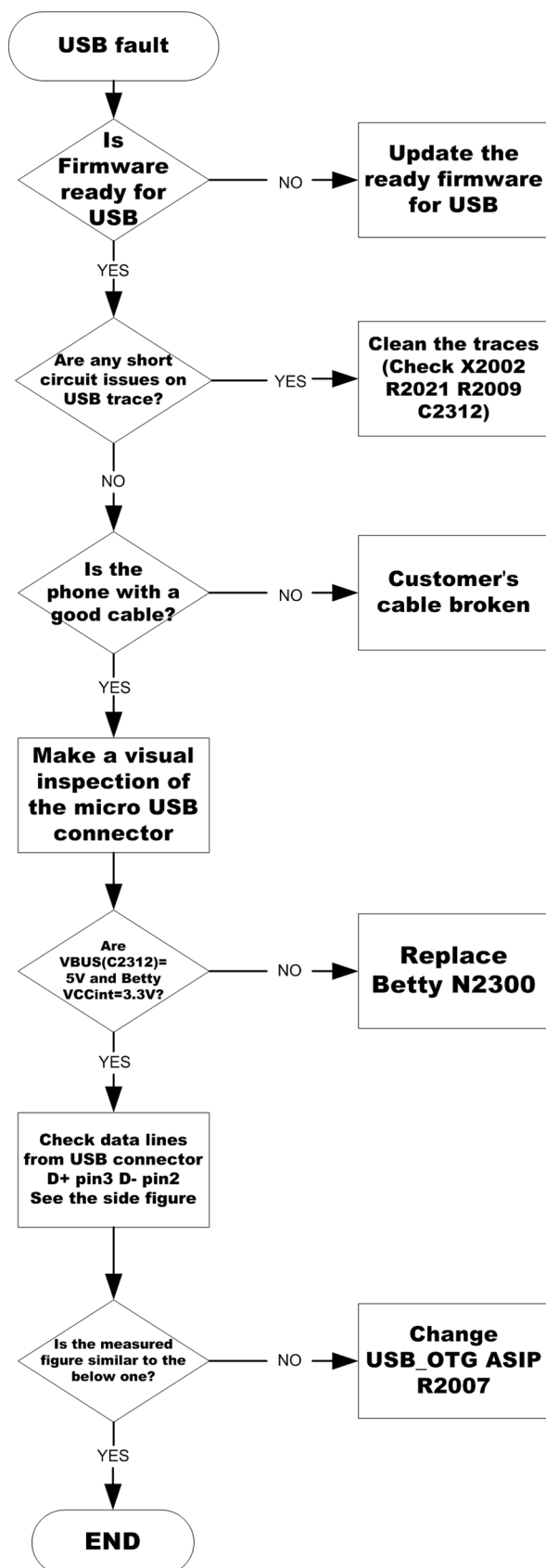
Combo memory troubleshooting

Troubleshooting flow



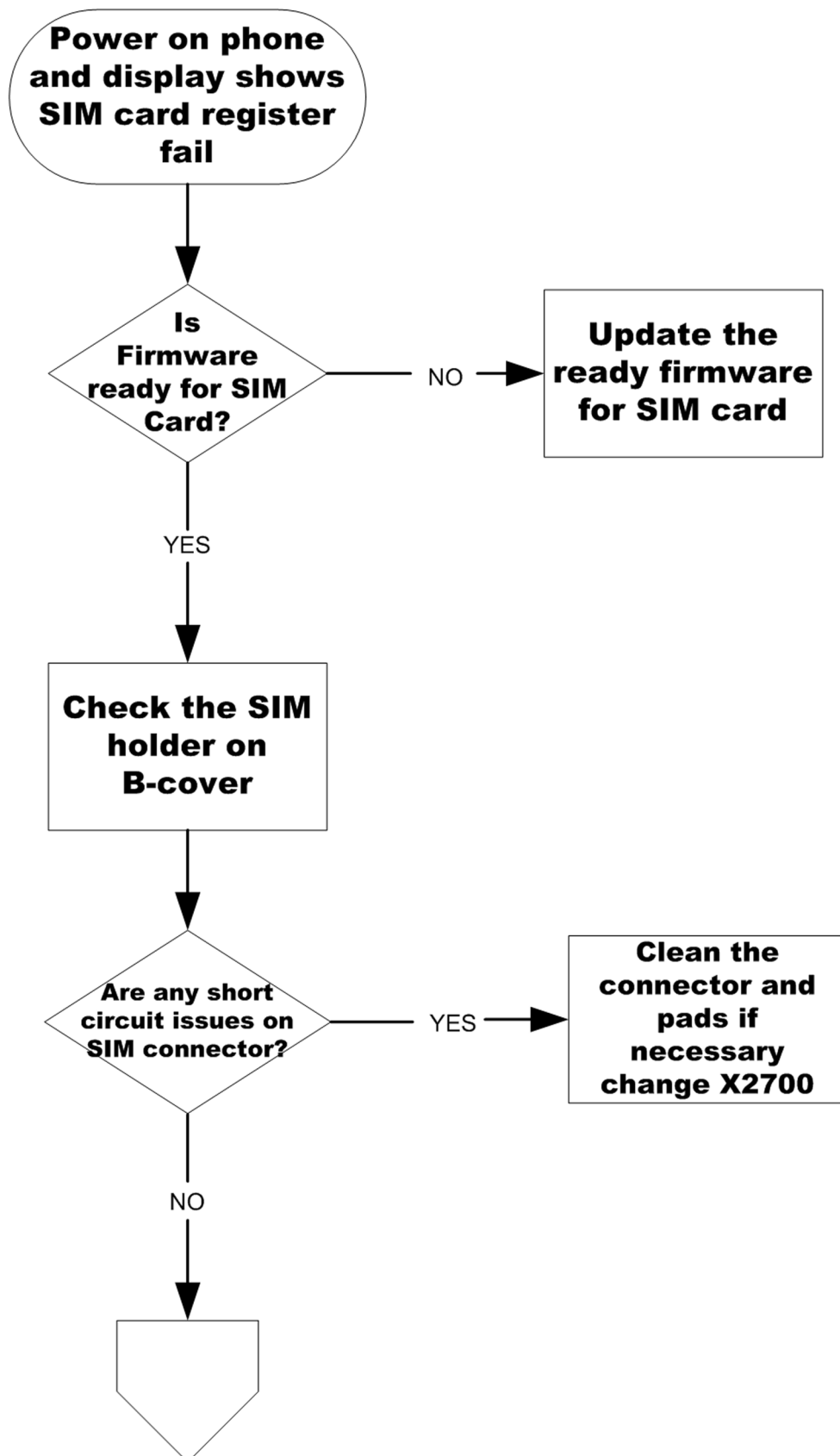
USB interface troubleshooting

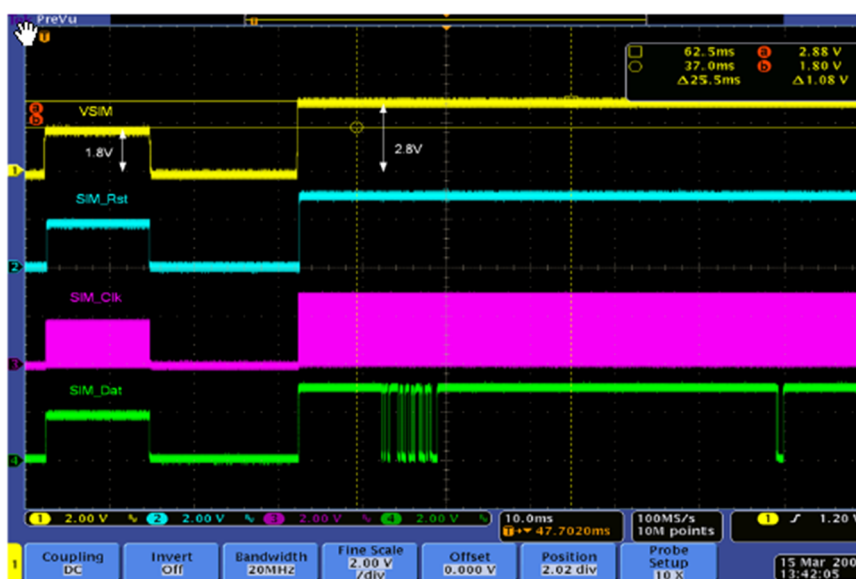
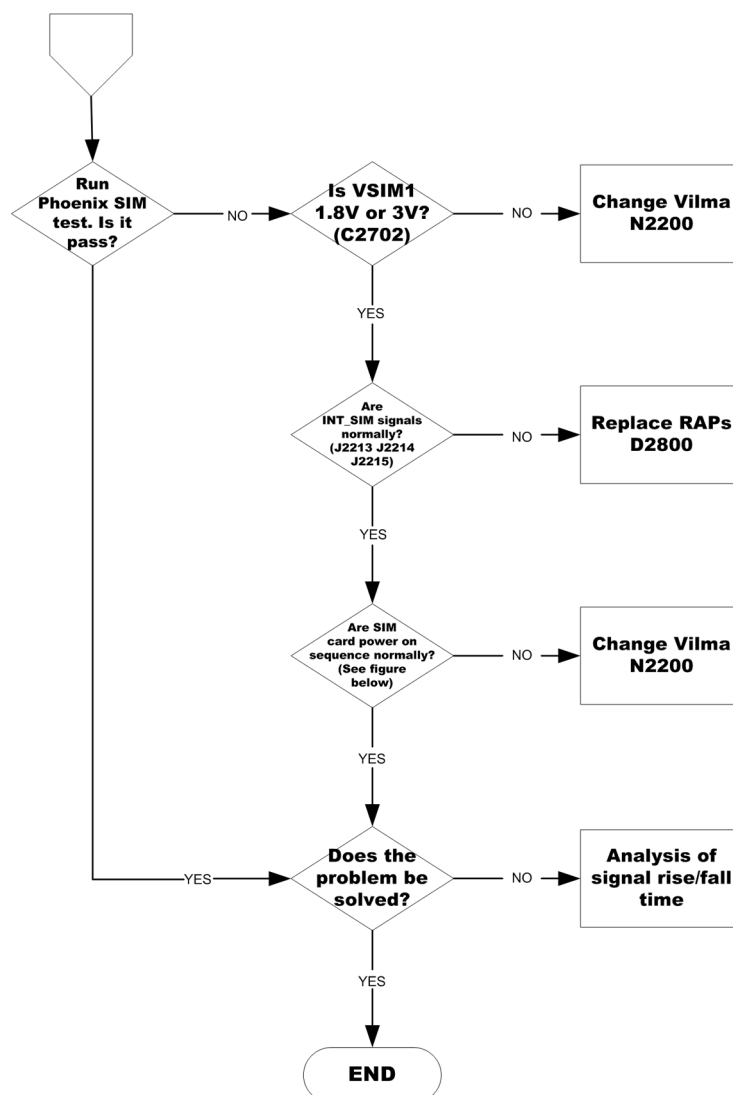
Troubleshooting flow



SIM card troubleshooting

Troubleshooting flow





■ User interface troubleshooting

Keypad troubleshooting

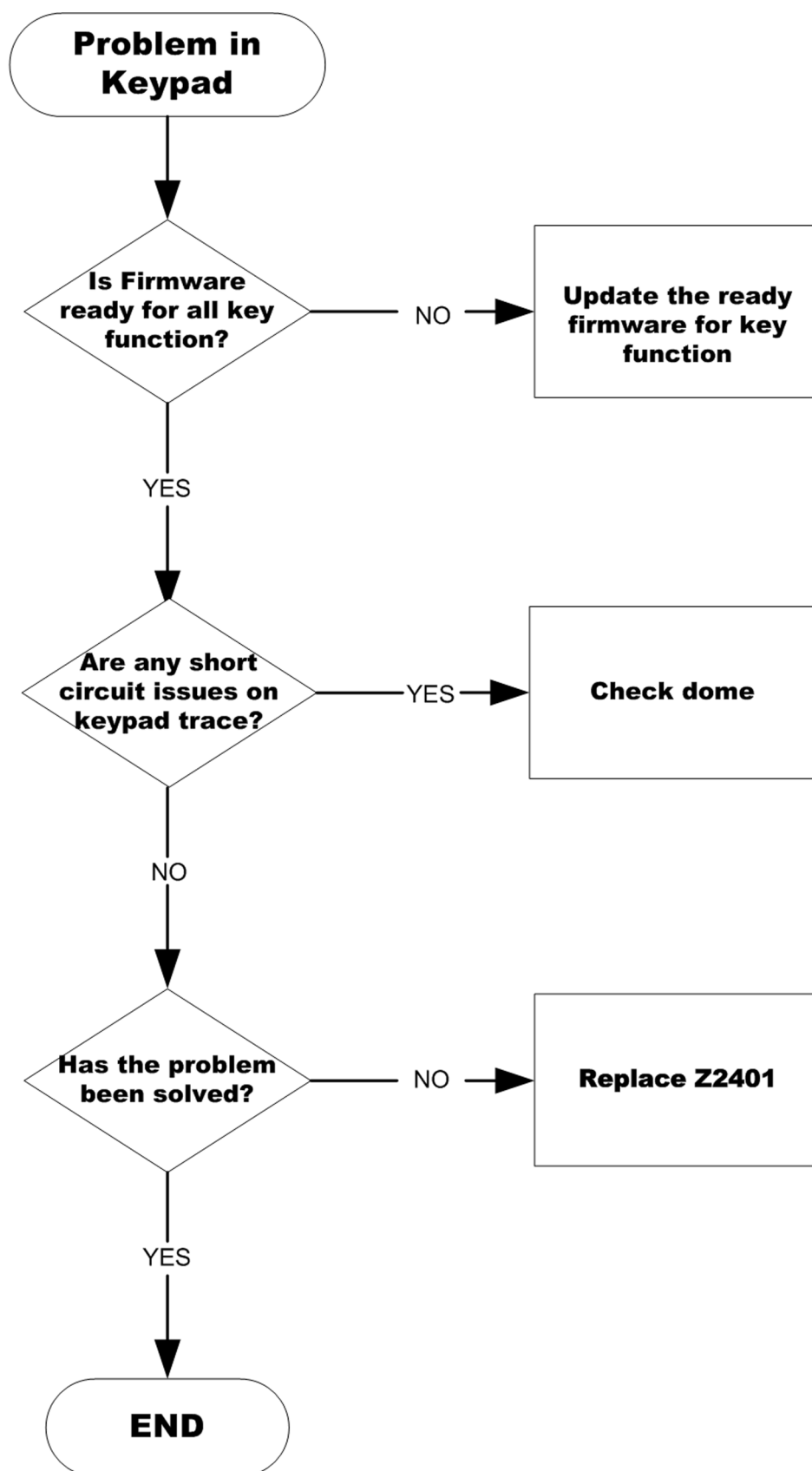
Context

There are two possible failure modes in the keyboard module:

- One or more keys are stuck, so that the key does not react when a keydome is pressed. This kind of failure is caused by mechanical reasons (dirt, rust, mechanical damage, etc.)
- Malfunction of several keys at the same time; this happens when one or more rows or columns in the key matrix are failing (shortcut or open connection).

If the failure mode is not clear, start with the Keyboard test in Phoenix.

Troubleshooting flow



Display module troubleshooting

General instructions for display troubleshooting

Context

- The display is in a normal mode when the phone is in active use.
- Display is in a partial idle mode when the phone is in the screen saver mode.
- The operating modes of the display can be controlled with the help of *Phoenix*.

Table 4 Display module troubleshooting cases

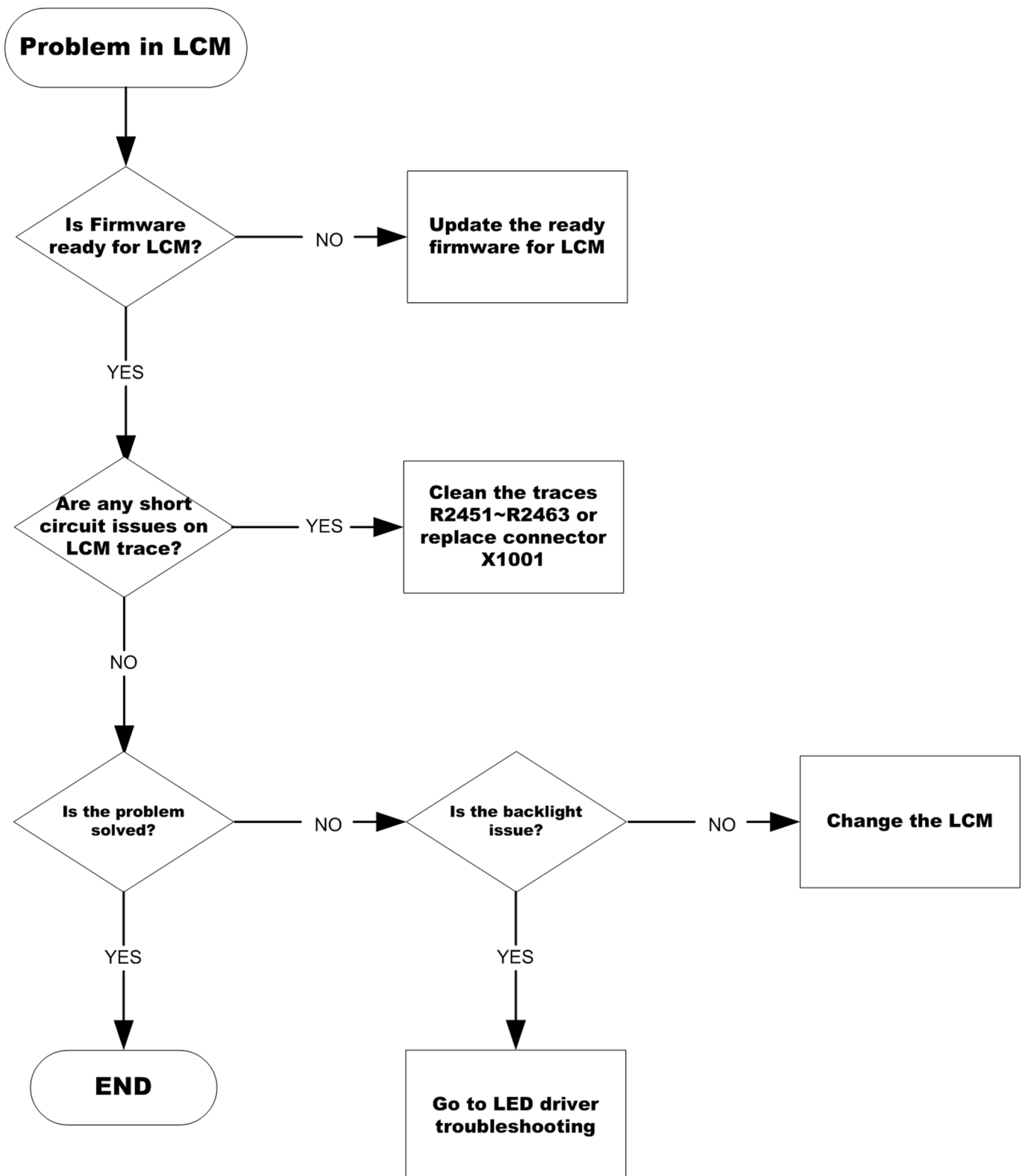
Display blank	There is no image on the display. The display looks the same when the phone is on as it does when the phone is off. The backlight can be on in some cases.
Image on the display not correct	Image on the display can be corrupted or a part of the image can be missing. If a part of the image is missing, change the display module. If the image is otherwise corrupted, follow the appropriate troubleshooting diagram.
Visual defects (pixel)	Pixel defects can be checked by controlling the display with Phoenix. Use both colours, black and white, on a full screen. The display may have some random pixel defects that are acceptable for this type of display. The criteria when pixel defects are regarded as a display failure, resulting in a replacement of the display, are presented the following table.

Table 5 Pixel defects

Item		White dot defect				Black dot defect	Total
1	Defect counts	R	G	B	White Dot Total	1	1
		1	1	1	1		
2	Combine d defect counts	Not allowed. Two single dot defects that are within 5 mm of each other should be interpreted as combined dot defect.					

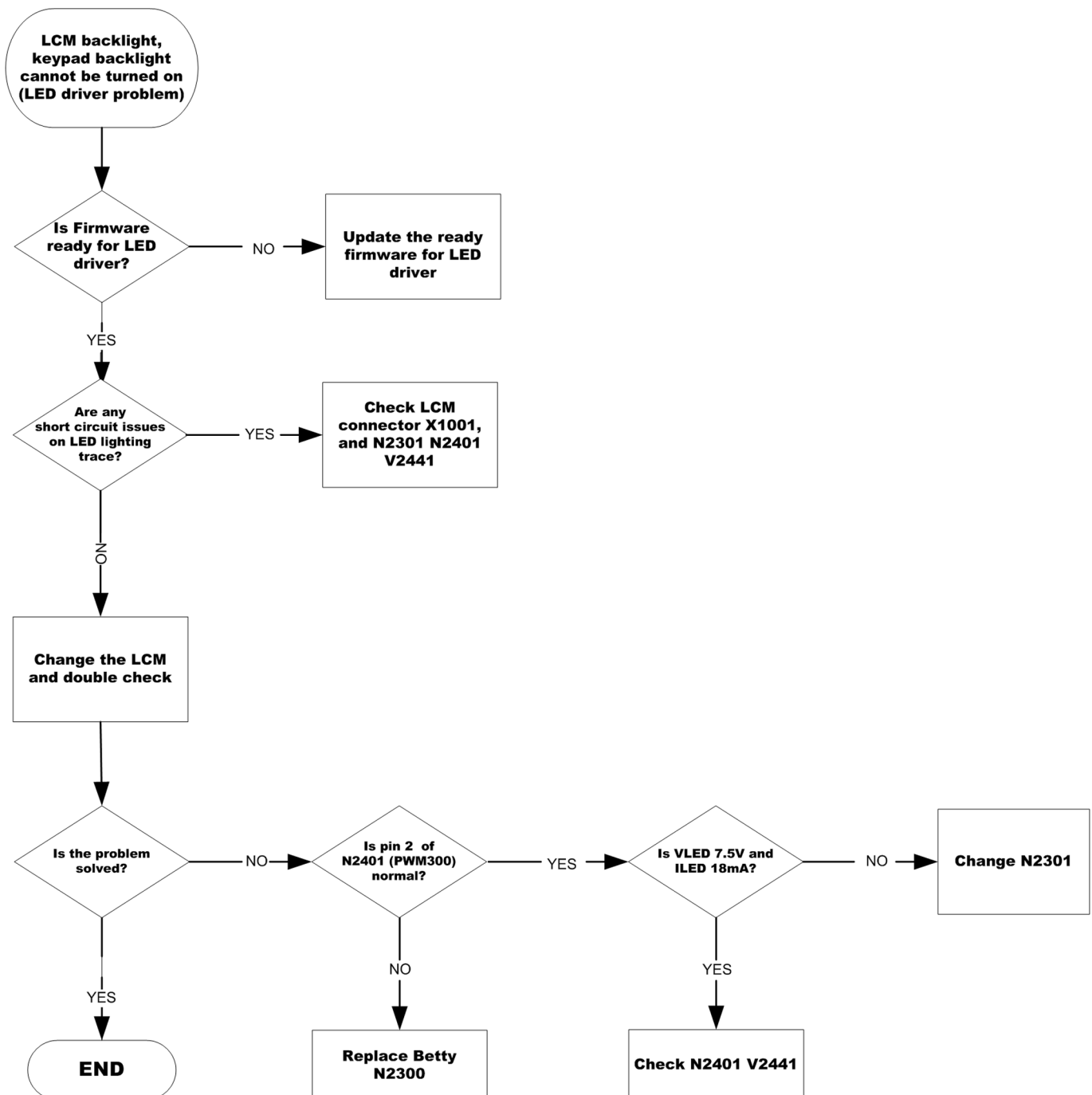
Display troubleshooting

Troubleshooting flow



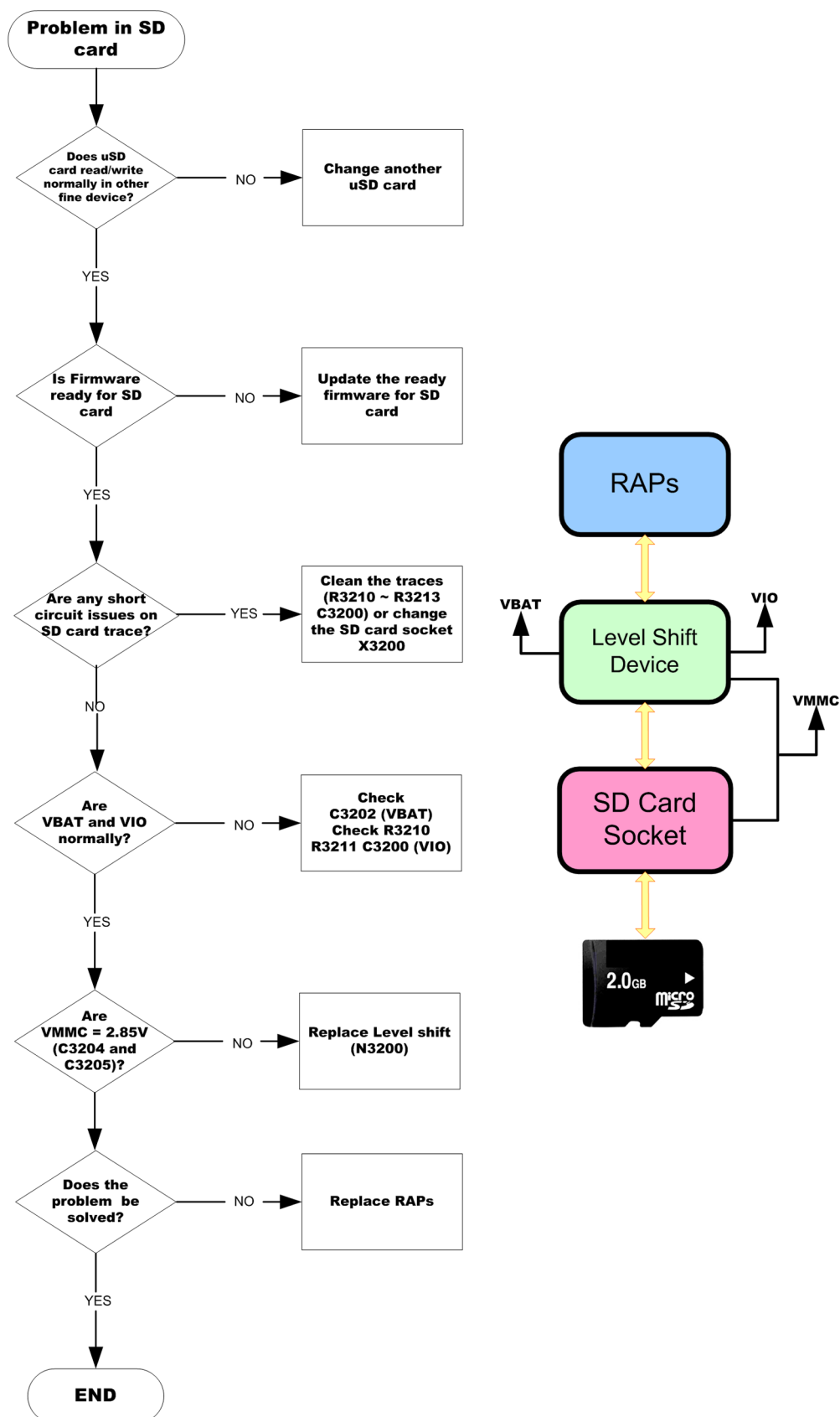
Keyboard backlight troubleshooting

Troubleshooting flow



SD card troubleshooting

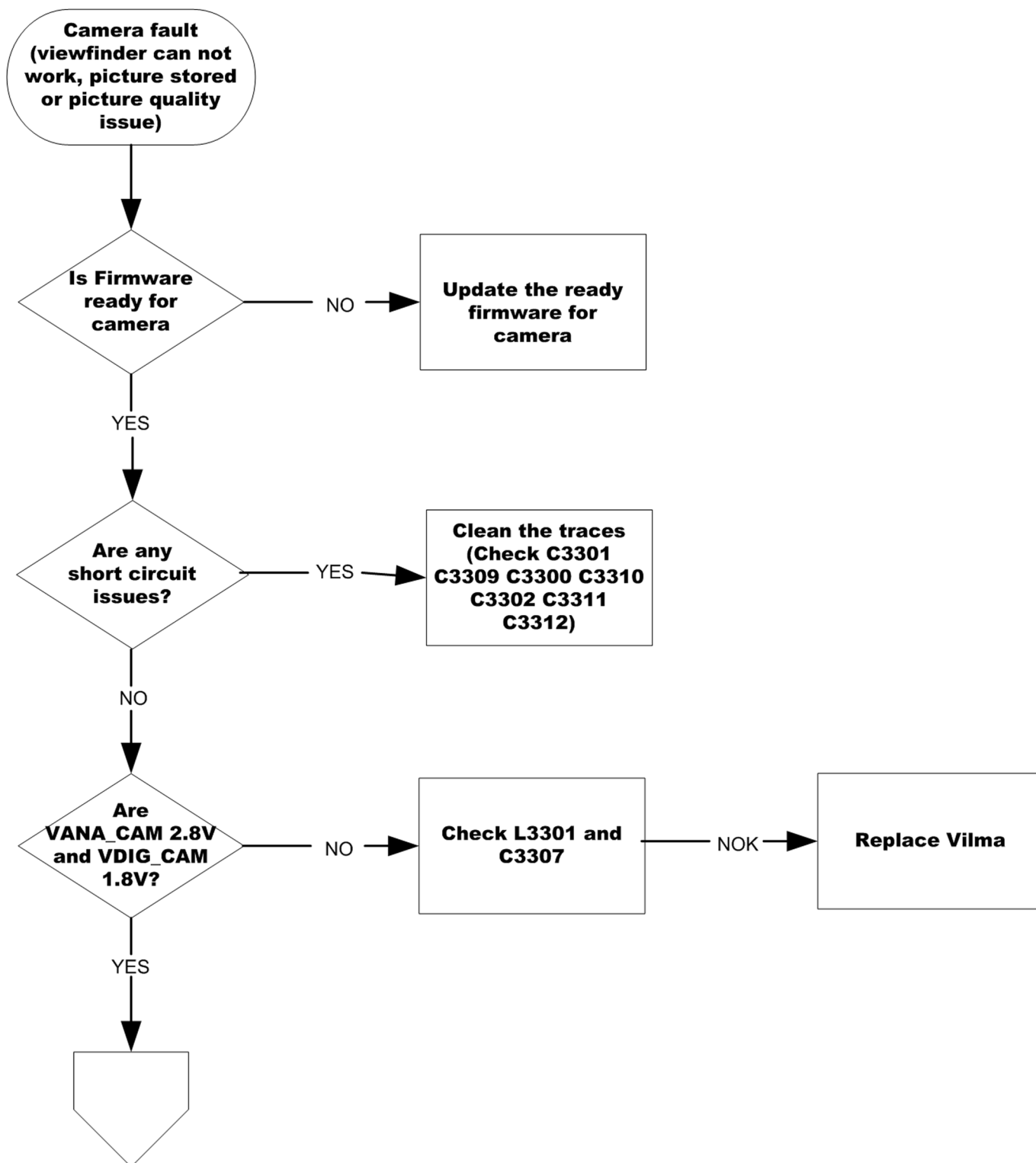
Troubleshooting flow

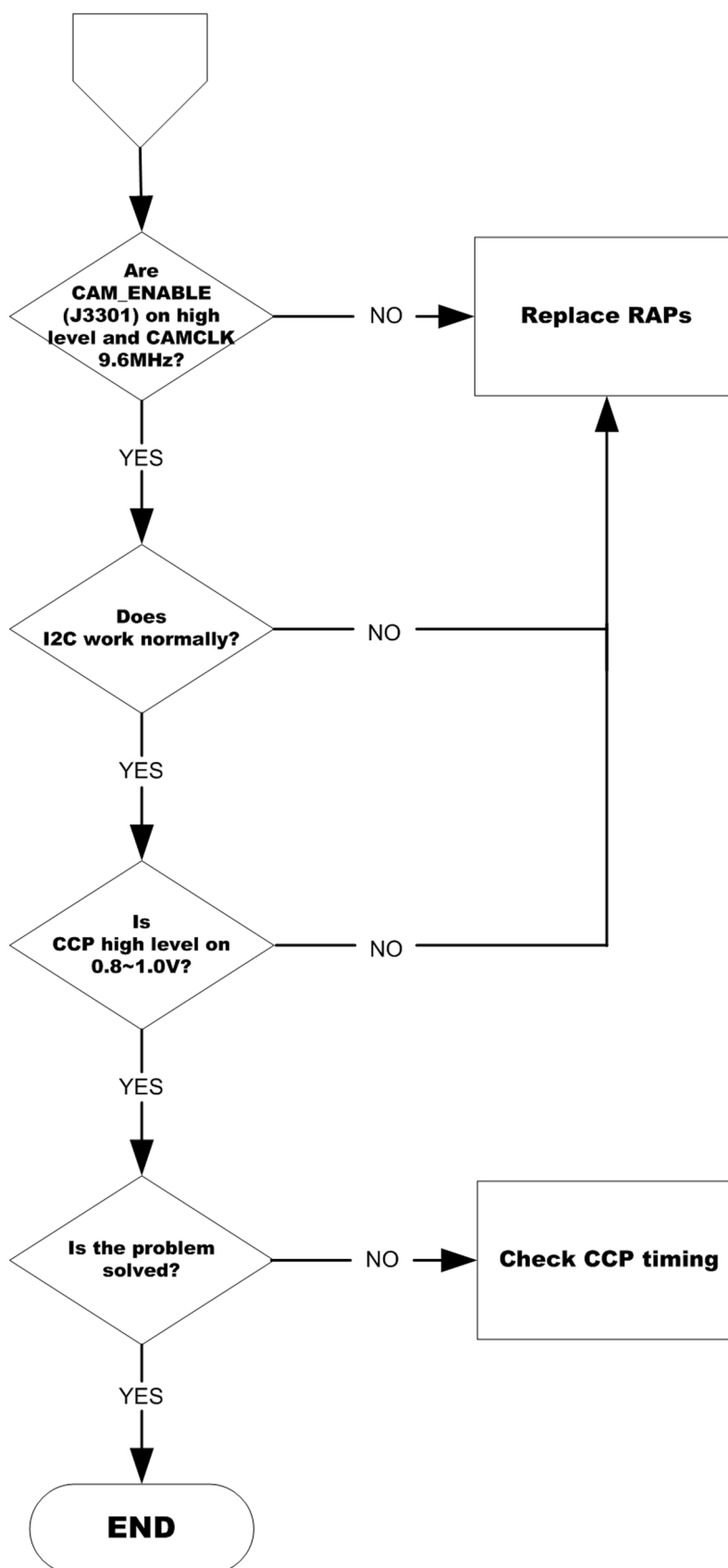


■ Camera troubleshooting

Camera troubleshooting

Troubleshooting flow





■ Audio troubleshooting

Audio troubleshooting test instructions

Differential external earpiece and internal earpiece outputs can be measured either with a single-ended or a differential probe.

When measuring with a single-ended probe each output is measured against the ground.

Internal handsfree output is measured using a current probe, if a special low-pass filter designed for measuring a digital amplifier is not available. Note also that when using a current probe, the input signal frequency must be set to 2kHz.

The input signal for each loop test can be either single-ended or differential.

Required equipment

The following equipment is needed for the tests:

- Oscilloscope
- Function generator (sine waveform)
- 'Active speaker' or 'speaker and power amplifier'
- Sound level meter
- Current probe (Internal handsfree DPMA output measurement)
- Phoenix service software
- Battery voltage 3.7V

Test procedure

Audio can be tested using the Phoenix audio routings option. Three different audio loop paths can be activated:

- External microphone to Internal earpiece
- External microphone to Internal handsfree speaker
- Internal microphone to External earpiece

Each audio loop sets routing from the specified input to the specified output enabling a quick in-out test. Loop path gains are fixed and they cannot be changed using Phoenix. Correct pins and signals for each test are presented in the following table.

Phoenix audio loop tests and test results

The results presented in the table apply when no accessory is connected and battery voltage is set to 3.7V.

Earpiece, internal microphone and speaker are in place during measurement. Applying a headset accessory during measurement causes a significant drop in measured quantities.

The gain values presented in the table apply for a differential output vs. single-ended/differential input.

Loop test	Input terminal	Output terminal	Path gain [dB] (fixed)	Input voltage [mVp-p]	Differential output voltage [mVp-p]	Output DC level [V]	Output current [mA]
External Mic to External Earpiece	XMICP and GND	HSEAR R P, HSEAR R N and GND	-2.9	1000	720	1.2	NA
		HSEAR P, HSEAR N and GND					
	XMICN and GND	HSEAR R P, HSEAR R N and GND					
		HSEAR P, HSEAR N and GND					
External Mic to Internal Earpiece	XMICP and GND	EarP and GND	-4.5	1000	600	1.2	NA
		EarN and GND					
	XMICN and GND	EarP and GND					
		EarN and GND					
External Mic to Internal handsfree	XMICP and GND	B2101 pads	-5	1000	560	0	25mA (calc.)
	XMICN and GND	B2101 pads					
Internal Mic to External Earpiece	B2150 (OUT/GND)	HSEAR R P, HSEAR R N and GND	22.7	100	1360	1.2	NA
		HSEAR P, HSEAR N and GND					

Measurement data

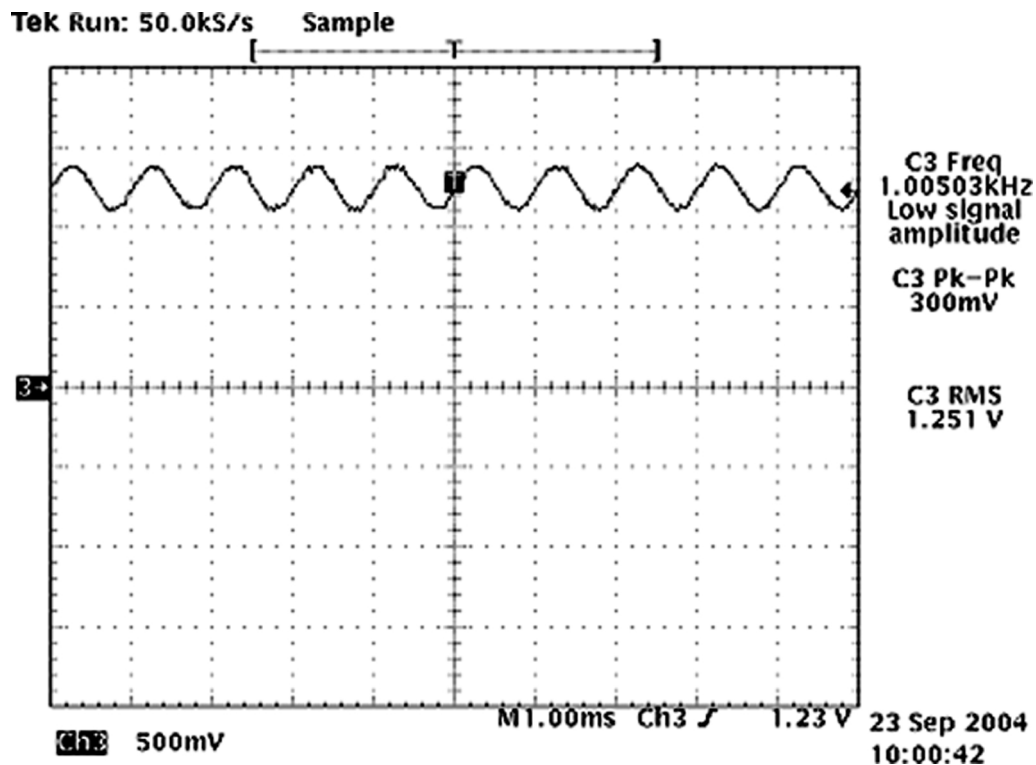
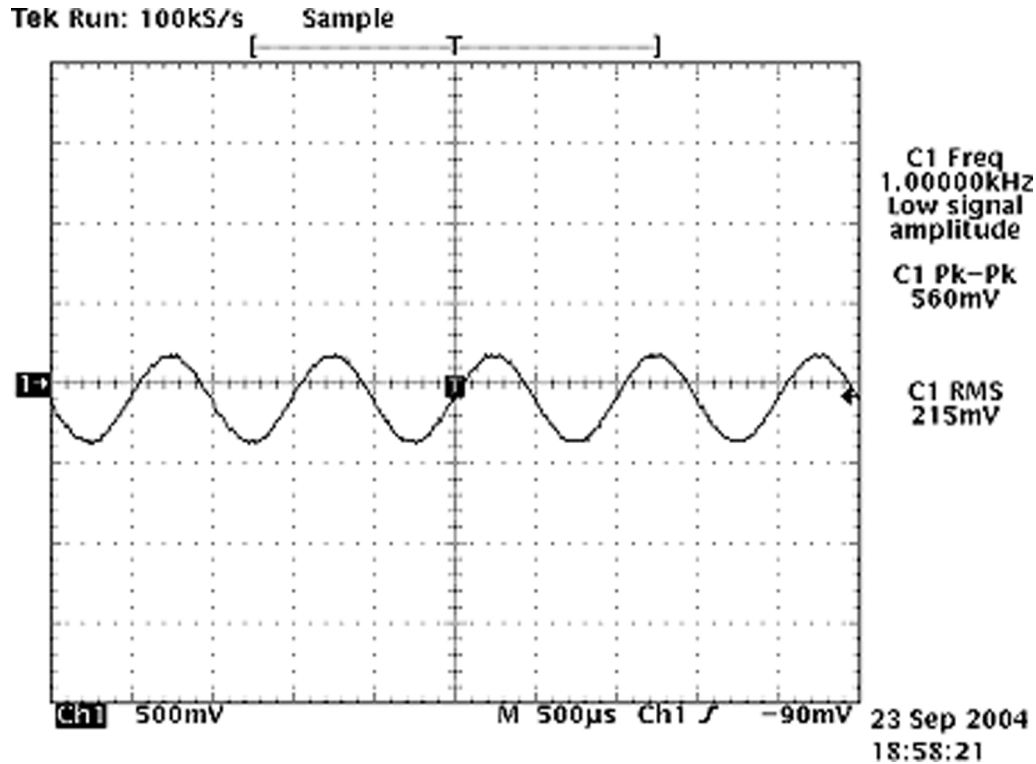


Figure 13 Single-ended output waveform of the Ext_in_HP_out measurement when earpiece is connected.



If a special low-pass filter designed for measuring digital amplifiers is unavailable, the measurement must be performed with a current probe and the input signal frequency must be 2kHz.

Figure 14 Differential output waveform of the Ext_in_IHF_out out loop measurement when speaker is connected.

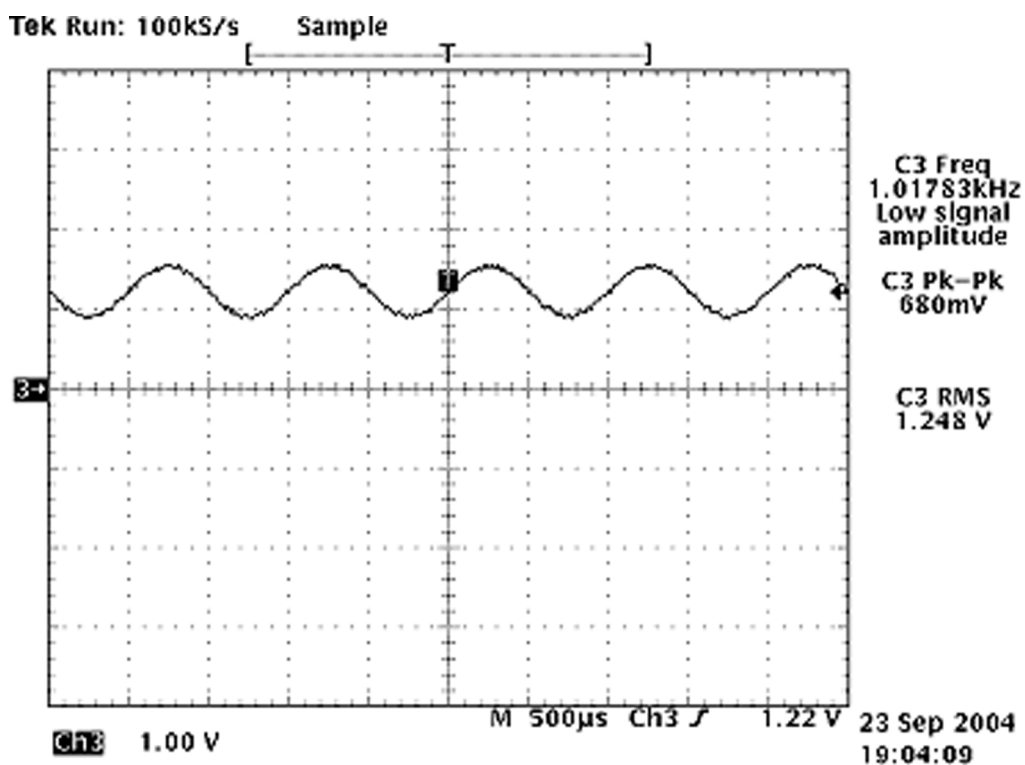
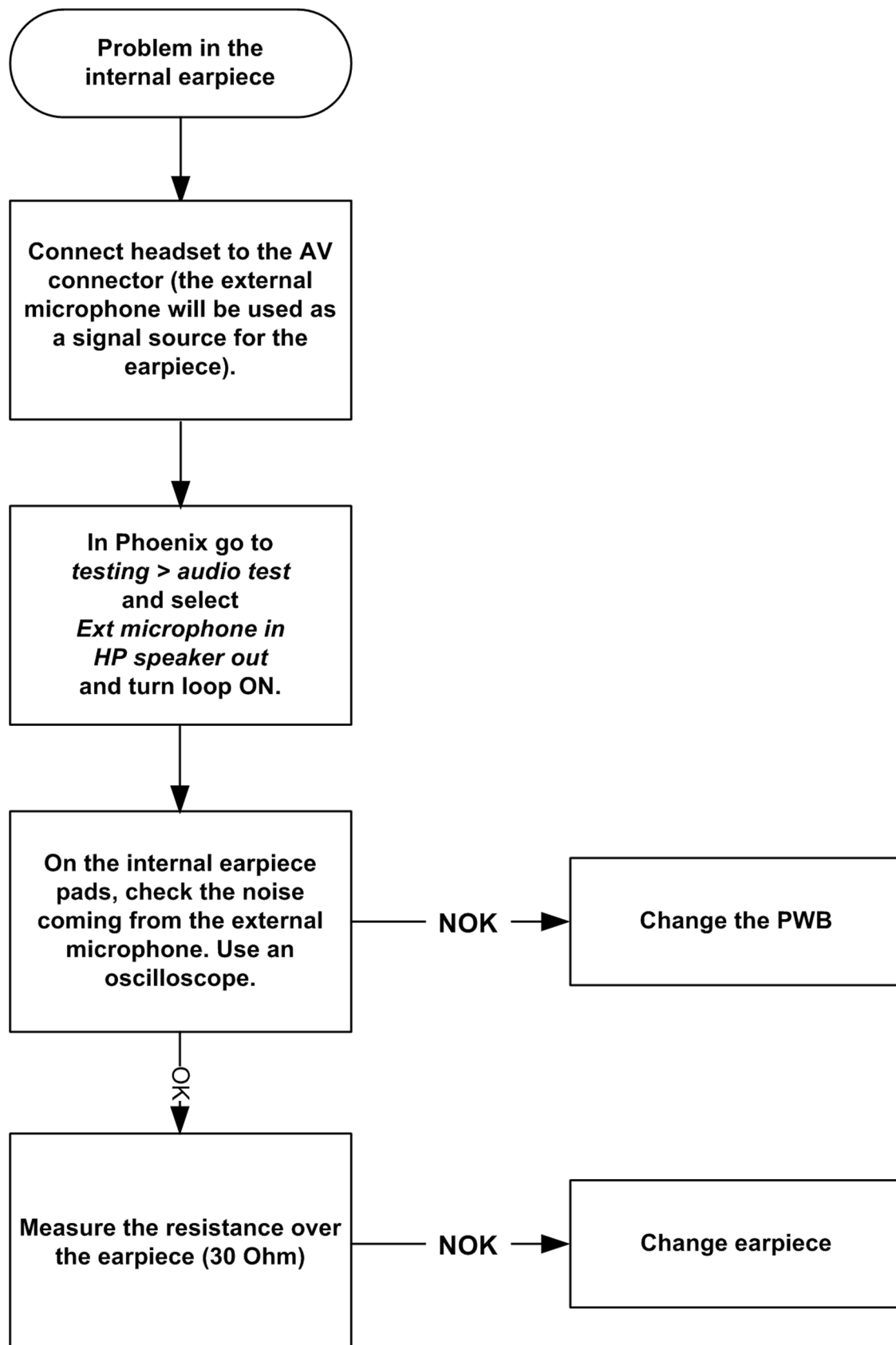


Figure 15 Single-ended output waveform of the HP_in_Ext_out loop when microphone is connected.

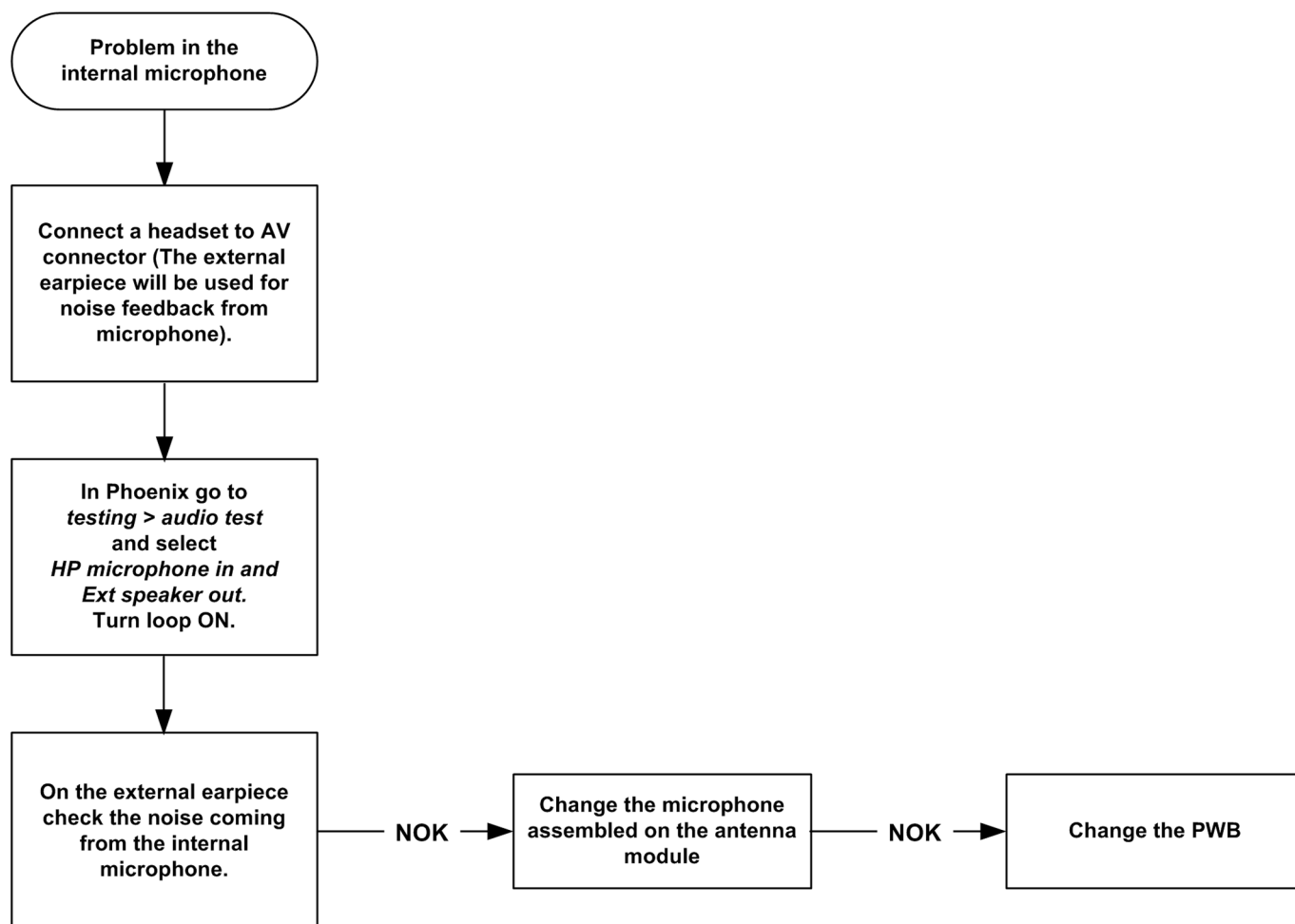
Internal earpiece troubleshooting

Troubleshooting flow



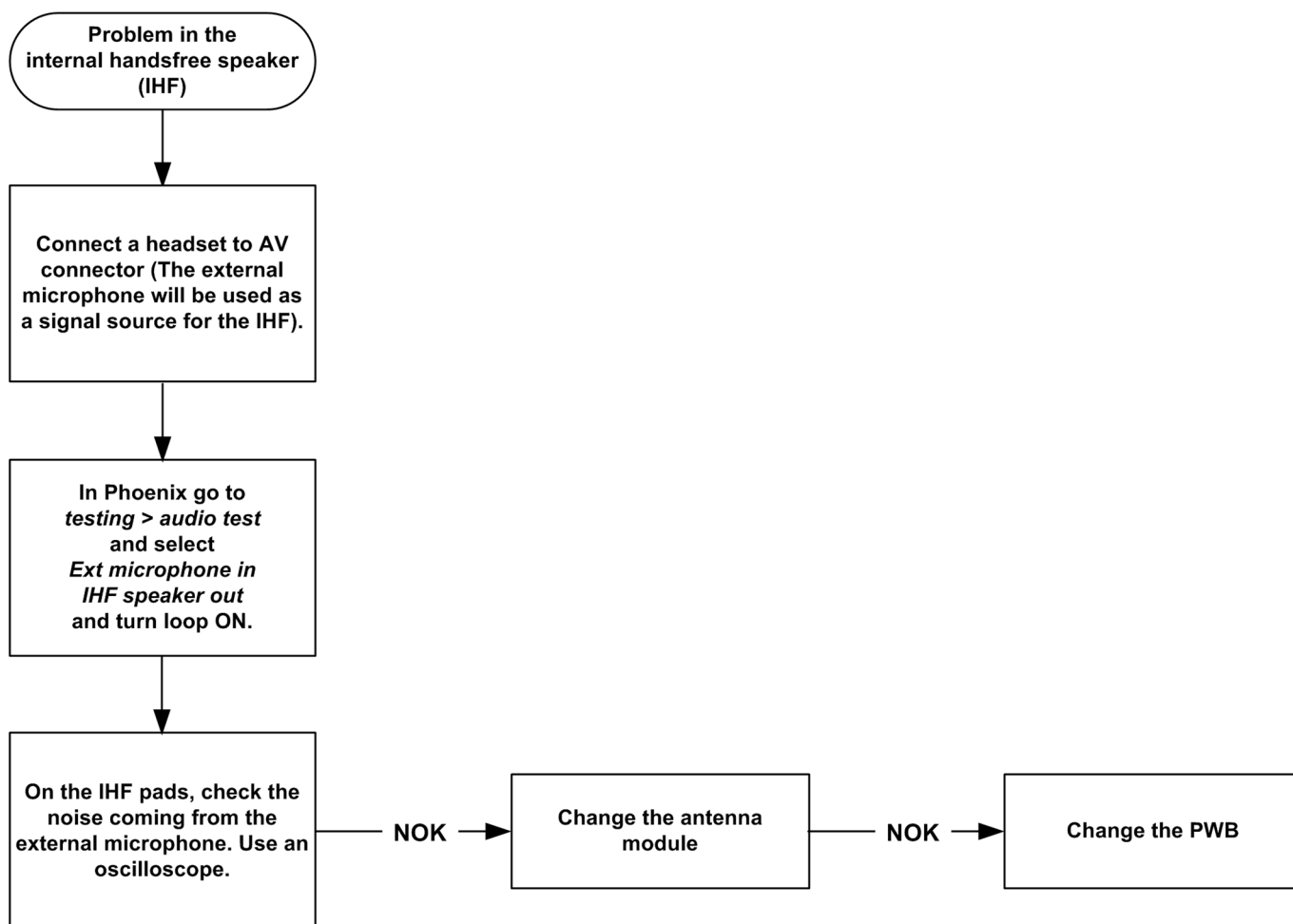
Internal microphone troubleshooting

Troubleshooting flow



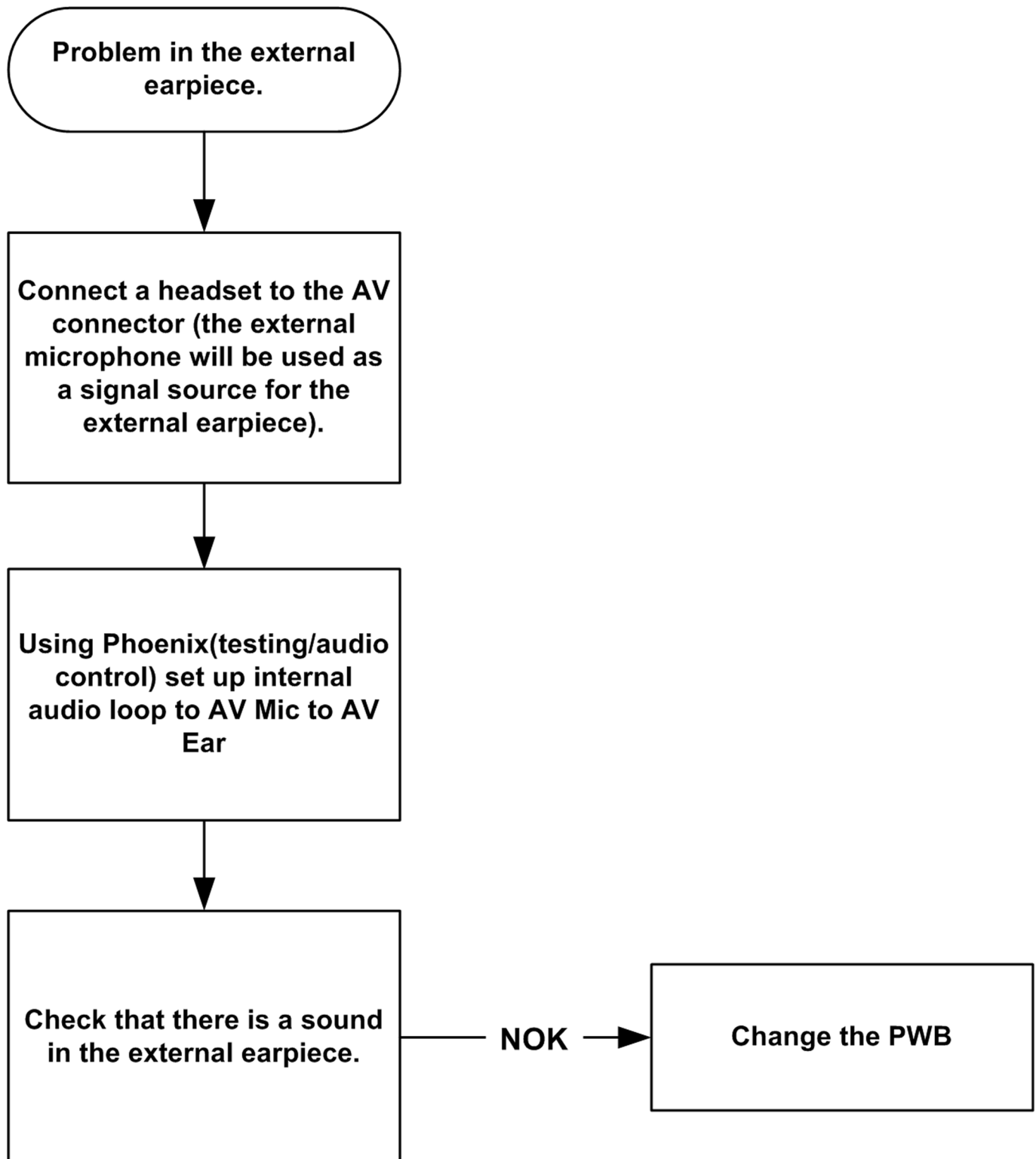
Internal handsfree (IHF) troubleshooting

Troubleshooting flow



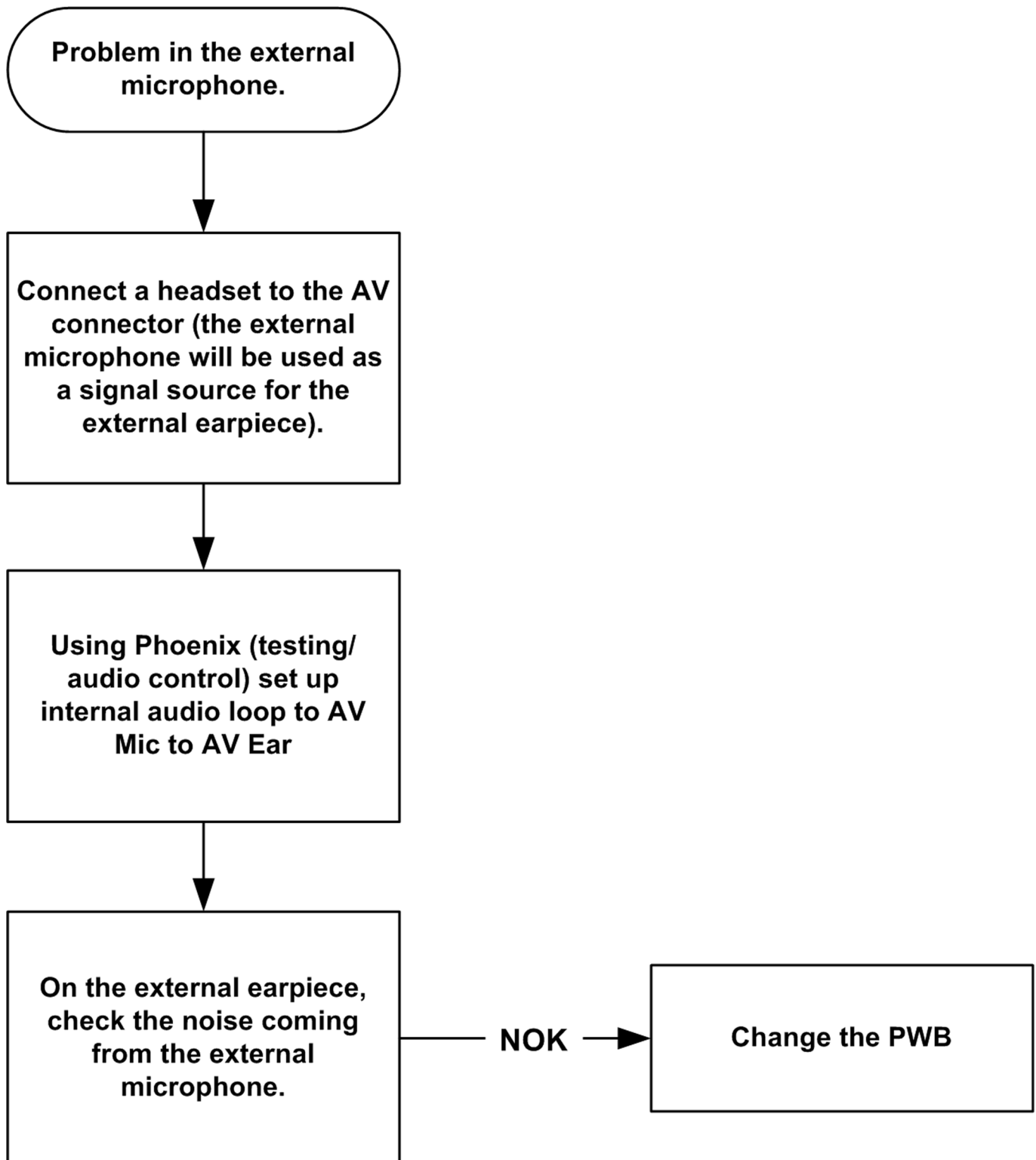
External earpiece troubleshooting

Troubleshooting flow



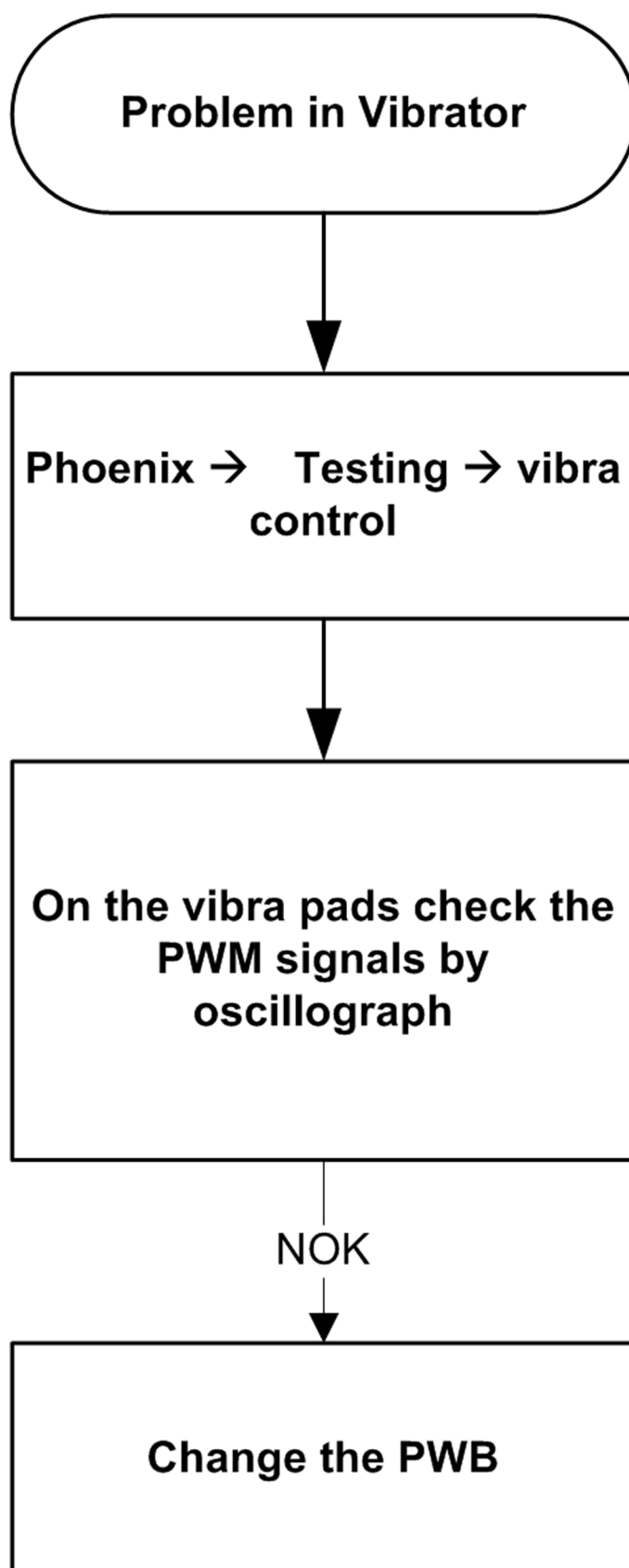
External microphone troubleshooting

Troubleshooting flow



Vibra troubleshooting

Troubleshooting flow



■ Baseband manual tuning guide

Certificate restoring for BB5 products

Context

This procedure is performed when the device certificate is corrupted for some reason.

All tunings (RF & Baseband, UI) must be done after performing the certificate restoring procedure.

The procedure for certificate restoring is the following:

- Flash the phone with the latest available software using FPS-21.
 - Note:** USB flashing does not work for a dead BB5 phone.
- Create a request file.
- Send the file to Nokia by e-mail. Use the following addresses depending on your location:
 - APAC: sydney.service@nokia.com
 - CHINA: repair.ams@nokia.com
 - E&A: salo.repair@nokia.com
 - AMERICAS: fls1.usa@nokia.com
- When you receive a reply from Nokia, carry out certificate restoring.
- Tune the phone completely.
 - Note:** SX-4 smart card is needed.
- If the phone resets after certificate restoring, reflash the phone again.

Required equipment and setup:

- *Phoenix* service software v 2009.20 or newer
- The latest phone model specific *Phoenix* data package
- PKD-1 dongle
- SX-4 smart card (Enables BB5 testing and tuning features)
- External smart card reader
- Activated FPS-21 flash prommer
- Flash update package 09.23.12.4 or newer for FPS-21 flash prommer
- CU-4 control unit
- USB cable from PC USB Port to CU-4 control unit
- Phone model specific adapter for CU-4 control unit
- PCS-1 cable to power CU-4 from external power supply
- XCS-4 modular cable between flash prommer and CU-4.

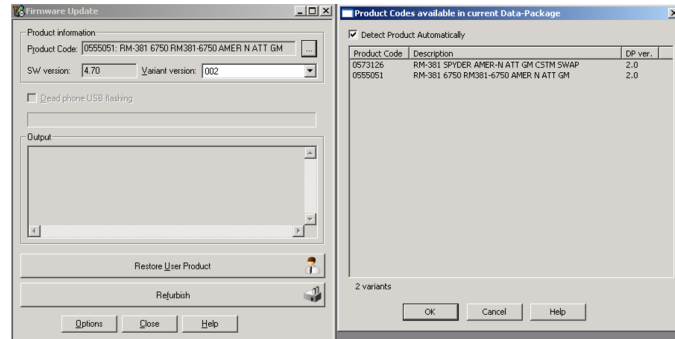
Note: CU-4 must be supplied with +12 V from an external power supply in all steps of certificate restoring.

Steps

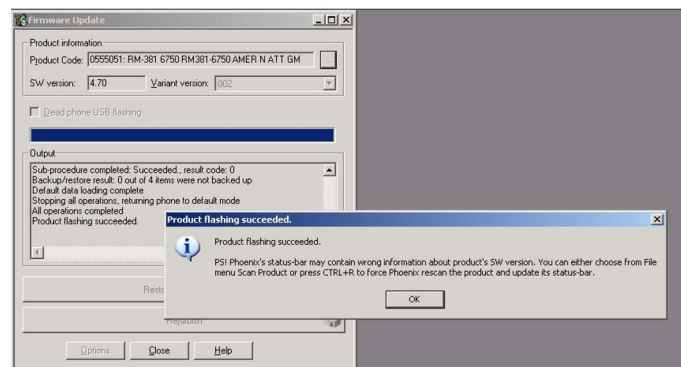
1. Program the phone software.
 - i Start *Phoenix* and login. Make sure the connection has been managed correctly for FPS-21.
 - ii Update the phone MCU software to the latest available version.

If the new flash is empty and the phone cannot communicate with *Phoenix*, reflash the phone.

- iii Choose the product manually from **File→Open Product** , and click **OK**.
Wait for the phone type designator (e.g. "RM-381") to be displayed in the status bar.
- iv Go to **Flashing→Firmware update** and wait until *Phoenix* reads the product data as shown in the following picture.



- v To continue, click **Refurbish**.
Progress bars and messages on the screen show actions during phone programming, please wait.

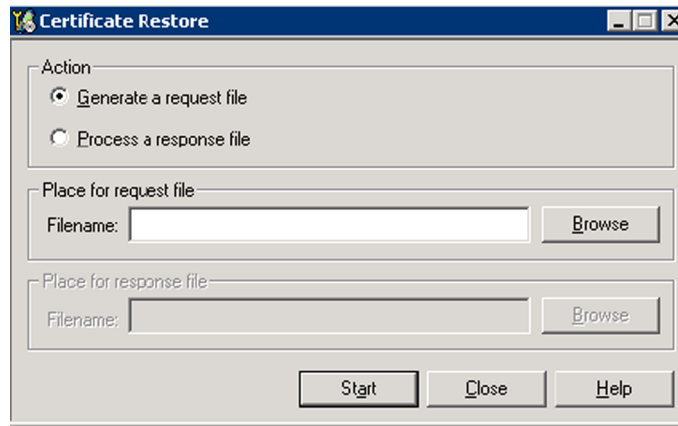


Programming is completed when Flashing Completed message is displayed.

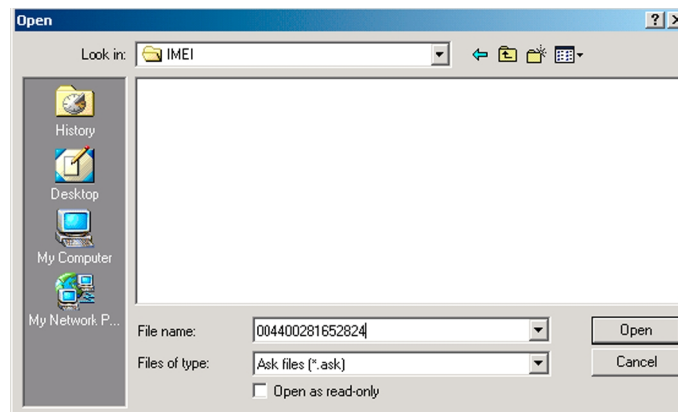
The product type designator and MCU SW version are displayed in the status bar.

- vi Close the *SW Update* window and then choose **File→Close Product** .
2. Create a *Request* file.
- For this procedure, you must supply +12 V to CU-4 from an external power supply.
- i To connect the phone with *Phoenix*, choose **File→Scan Product** .
 - ii Choose **Tools→Certificate Restore** .

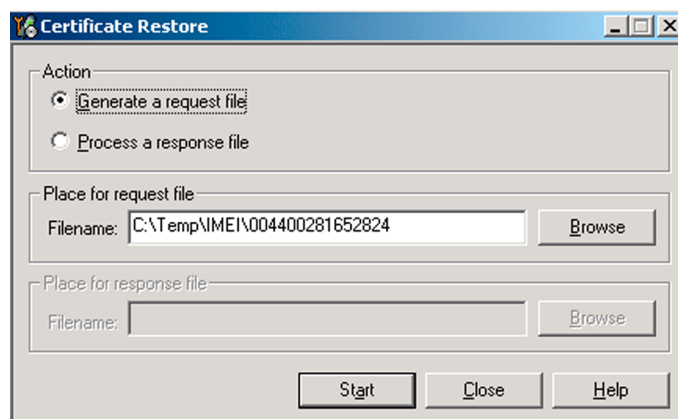
- iii To choose a location for the request file, click **Browse**.



- iv Name the file so that you can easily identify it, and click **Open**.

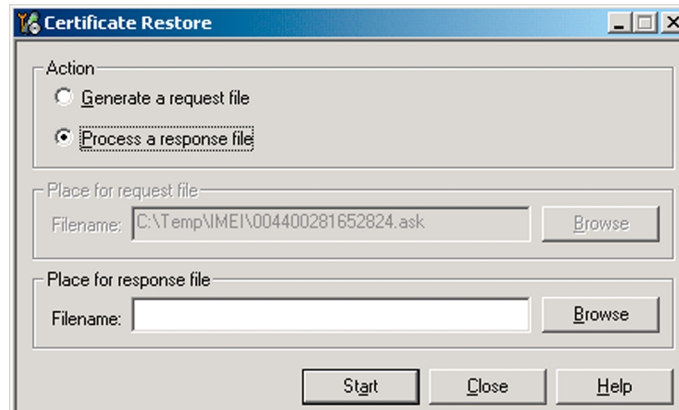


The name of the file and its location are shown.

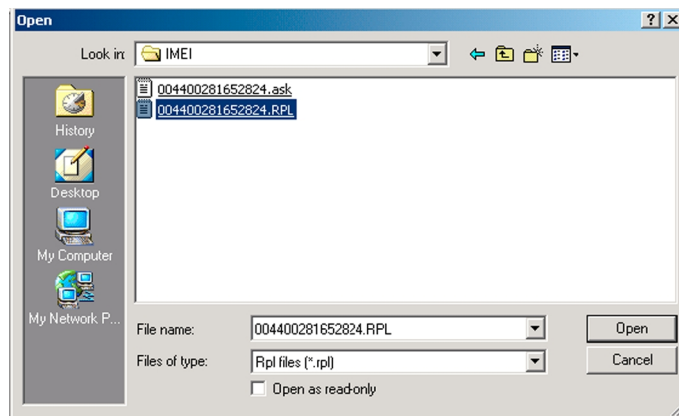


- v To create the *Request* file, click **Start**.
- vi When the file for certificate restore has been created, send it to Nokia as an e-mail attachment.
3. Restore certificate.
- For this procedure, you must supply +12 V to CU-4 from an external power supply.
- i Save the reply file sent by Nokia to your computer.
 - ii Start *Phoenix* service software.
 - iii Choose **File**→**Scan Product**.

- iv From the **Tools** menu, choose **Certificate Restore** and select **Process a response file** in the *Action* pane.

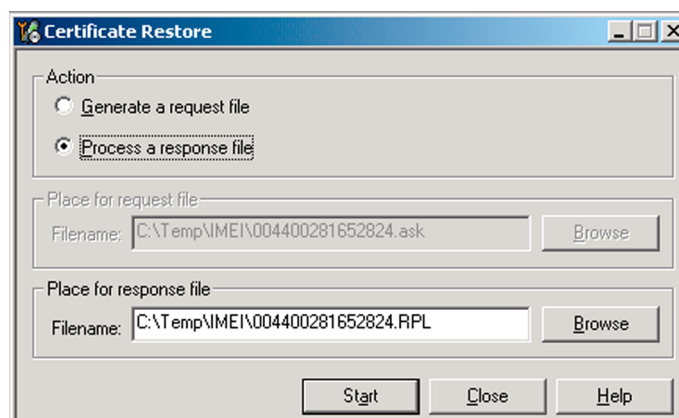


- v To choose the location where response file is saved, click **Browse**.
- vi Click **Open**.



The name of the file and the path where it is located are shown.

- vii To write the file to phone, click **Start**.



Next actions

After a successful rewrite, you must retune the phone completely by using *Phoenix* tuning functions.

Important: Perform all tunings: RF, BB, and UI.

Energy management calibration

Prerequisites

Energy Management (EM) calibration is performed to calibrate the setting (gain and offset) of AD converters in several channels (that is, **battery voltage**, **BSI**, **battery current**) to get an accurate AD conversion result.

Hardware setup:

- An external power supply is needed.
- Supply 12V DC from an external power supply to CU-4 to power up the phone.
- The phone must be connected to a CU-4 control unit with a product-specific flash adapter.

Steps

1. Place the phone to the docking station adapter (CU-4 is connected to the adapter).
2. Start *Phoenix* service software.
3. Choose **File**→ **Scan Product**.
4. Choose **Tuning**→**Energy Management Calibration**.
5. To show the current values in the phone memory, click **Read**, and check that communication between the phone and CU-4 works.
6. Check that the **CU-4 used** check box is checked.
7. Select the item(s) to be calibrated.

Note: ADC calibration has to be performed before other item(s). However, if all calibrations are selected at the same time, there is no need to perform the ADC calibration first.

8. Click **Calibrate**.

The calibration of the selected item(s) is carried out automatically.

The candidates for the new calibration values are shown in the *Calculated values* column. If the new calibration values seem to be acceptable (please refer to the following "Calibration value limits" table), click **Write** to store the new calibration values to the phone permanent memory.

Table 6 Calibration value limits

Parameter	Min.	Max.
ADC Offset	-20	20
ADC Gain	12000	14000
BSI Gain	1100	1300
VBAT Offset	2400	2650
VBAT Gain	19000	23000
VCHAR Gain	N/A	N/A
IBAT (ICal) Gain	7750	12250

9. Click **Read**, and confirm that the new calibration values are stored in the phone memory correctly. If the values are not stored to the phone memory, click **Write** and/or repeat the procedure again.
10. To end the procedure, close the *Energy Management Calibration* window.

4 — RF troubleshooting

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■ General RF troubleshooting

Introduction to RF troubleshooting

Troubleshooting process

RF troubleshooting is performed in this order:

- 1 Autotuning
- 2 General power checking
- 3 Selftests
- 4 RX and TX troubleshootings

Most RF semiconductors are static discharge sensitive

ESD protection must be applied during repair (ground straps and ESD soldering irons).

Pre-baking

These parts are moisture sensitive and must be pre-baked prior to soldering:

- RFIC N1001
- Front End Module (FEM) N1002

Discrete components

In addition to the two key-components, there are few number of discrete components (capacitors and inductors) for which troubleshooting is done mainly by *visual inspection*.

Capacitors: check for short circuits.

Note: In-circuit measurements should be evaluated carefully

Measuring equipment

All measurements should be done using:

- An oscilloscope for low frequency and DC measurements. Recommended probe: 10:1, 10Mohm//8pF.
- A radio communication tester including RF generator and spectrum analyser, for example Rohde & Schwarz CMU200. (Alternatively a spectrum analyser and an RF generator can be used. Some tests in this guide are not possible to perform if this solution is chosen).

Note: All measurements with an RF coupler should be performed in an RF-shielded environment because nearby base stations can disturb sensitive receiver measurements. If there is no possibility to use RF shielded environment, testing at frequencies of nearby base stations should be avoided.

Level of repair

The scope of this guideline is to enable repairs at key-component level. Please refer to the troubleshooting instructions for further information.

RF key components



Figure 16 RF key components

■ Auto tuning for RF

This phone can be tuned automatically.

Autotune is designed to align the phone's RF part easier and faster. It performs calibrations, tunings and measurements of RX and TX. The results are displayed and logged in a result file, if initiated.

Hardware set up

Hardware requirements for auto tuning:

- PC (Windows 2000/XP) with GPIB card
- Power supply
- Product specific module jig
- Cables: XRS-6 (RF cable), USB cable, GBIP cable and DAU-9S
- Signal analyser (TX), signal generator (RX) and RF-splitter *or* one device including all.

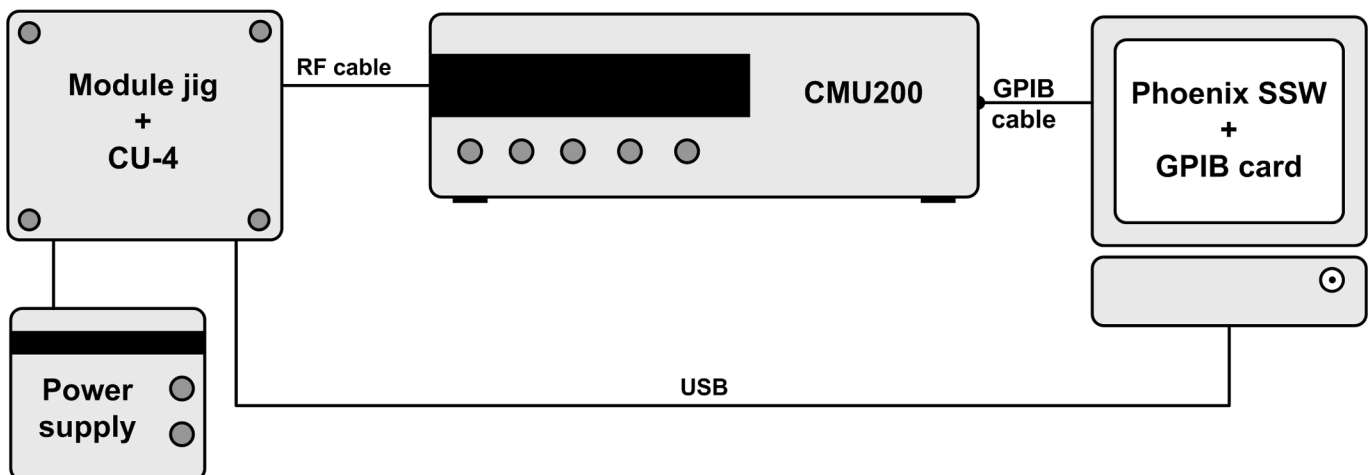


Figure 17 Auto tuning concept with CMU200

Phoenix preparations

Install the phone specific data package, for example *RM-578_dp_1.78_sw_sh3.26.exe*. This defines phone specific settings.

Auto tuning procedure

- 1 Make sure the phone (in the jig) is connected to the equipment. Else, some menus will not be shown in Phoenix.
- 2 To go to autotune, select *Tuning (Alt-U) > Auto-Tune (Alt-A)* from the menu.
- 3 Start autotuning, clicking the *Tune* button.

■ General voltage checking

Steps

1. Set up the main board in the module jig. The phone should be in local mode.
2. Check the following:

#	Signal name	Test point	Voltage (all bands)
1	Vbat at N7520 (FEM)	J2903	3.0-4.7 V
2	Vbat at N7505 (Transceiver)	C2070	3.0-4.7 V
3	VCCX0 supply	C2213	2.4-2.6 V

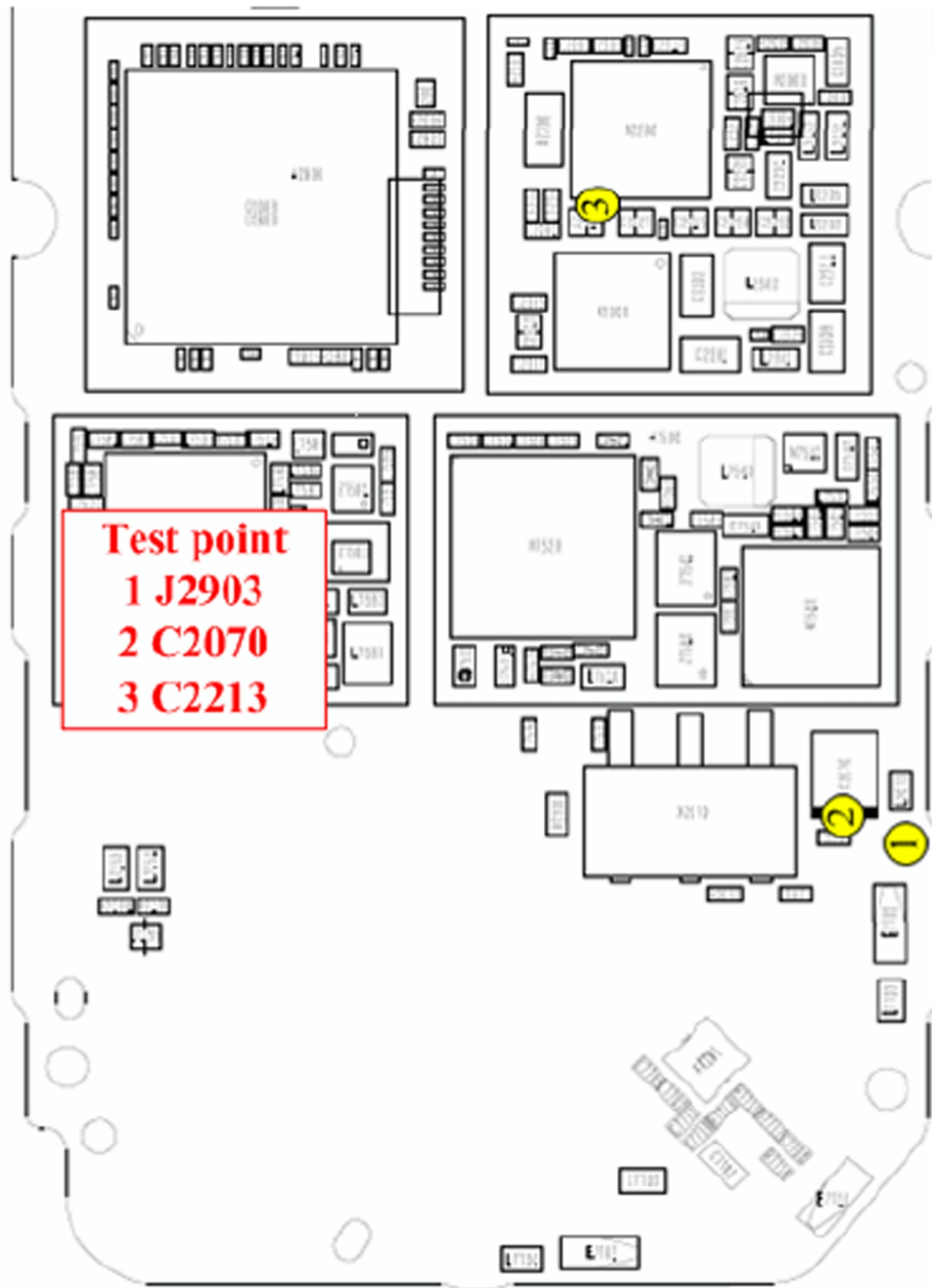


Figure 18 General voltage checking test points (main board, both sides)

■ Selftest troubleshooting

RF selftests

Prerequisites

Do a hardware initialization before you start the selftests:

Testing→**GSM**→**RF Controls**→ **RX** and then press **Stop**.

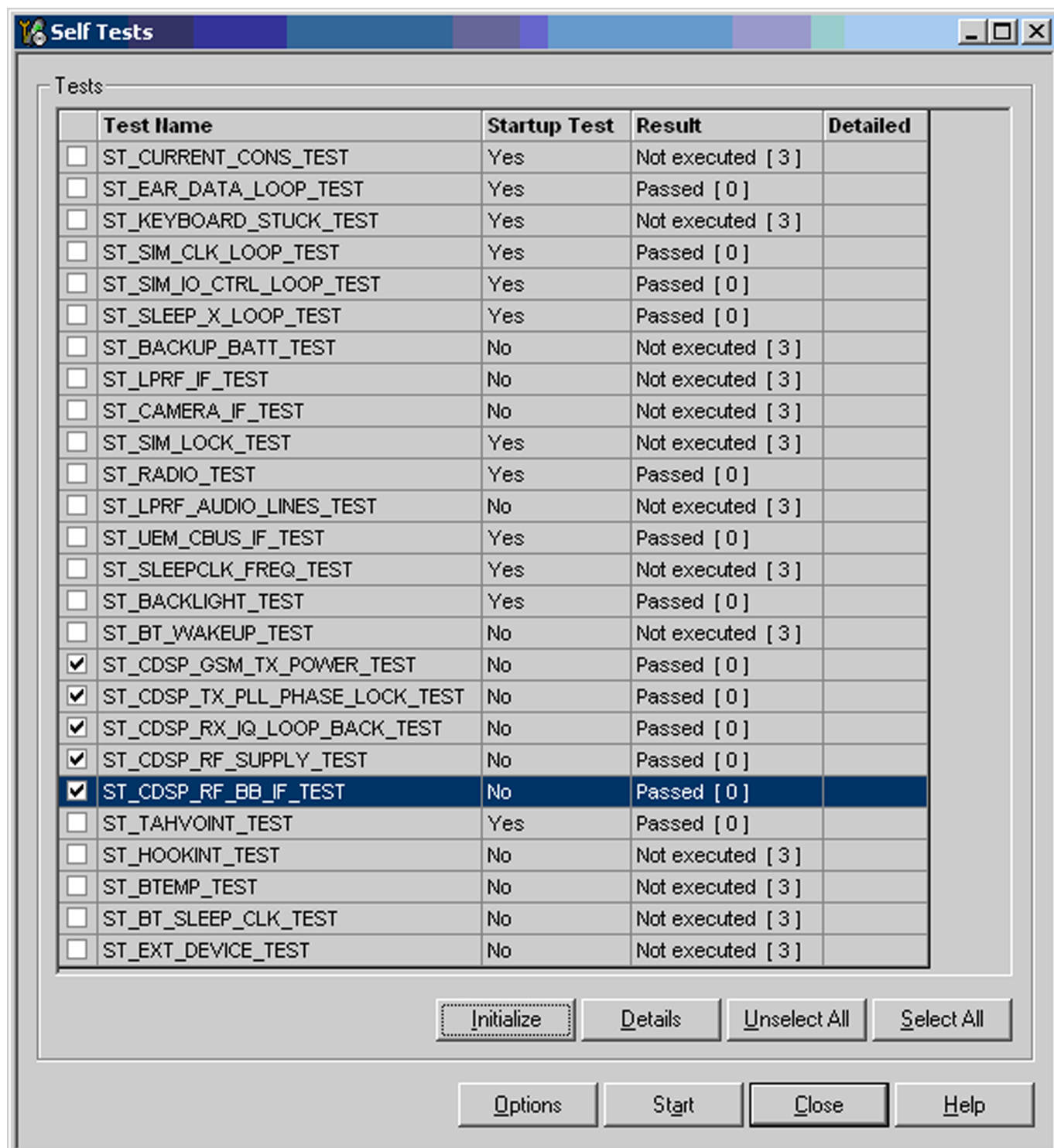
Context

Note: The RF connector should be terminated to 50 Ohms or connected to the antenna. Check this carefully before performing the self tests.

Note: The phone should be in **local mode** when performing Self tests

Steps

1. Check the tests shown in the figure below: **Testing**→ **Self Tests** , and press the **Start** button.



2. A test is either Passed or Fatal. If **Fatal** continue the selftest troubleshooting. If **Passed** continue with the other RF troubleshootings.

3. If Fatal, press **Details** to see error codes

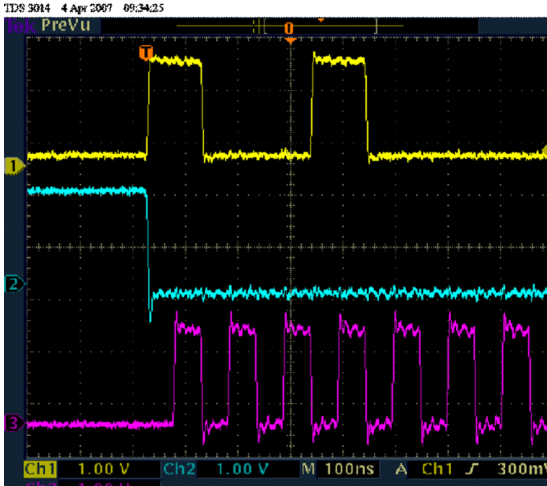
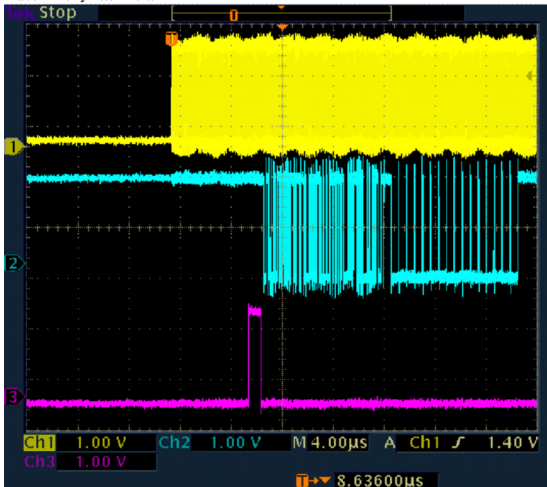
Error codes will now show up in the right most column marked *Detailed*.

Note: The Error Code contains the two first words: *0x00* and *0xC0*.

If a self test is fatal, check the **Details→Error code** and follow the instructions below.



This test is checking the communication between baseband and RF. It will show in what part the problem is located.

Error code	Test	Action
ST_RFBUS_WRITE_READ_FAIL (0x00, 0x40) or combination (0x00, 0xC0)	<p>In Phoenix Testing→ GSM→ RF Controls→RX Probe:</p> <ol style="list-style-type: none"> 1 J2805 SDATA (Ch1) [1] 2 J2806 ENX (Ch2) [2] 3 J2804 SCLK (Ch3) [3] <p>The result should look like this:</p>  <p>Figure 20 Settings: Time 1ns/d + 0.1Vpp/d</p>	<p>All OK: replace N7505 NOK : go to BB troubleshooting</p>
ST_TXFIFO_WRITE_READ_FAIL (0x00, 0x80)	<p>In Phoenix: Testing→ GSM→ RF Controls→TX Probe:</p> <ol style="list-style-type: none"> 1 J2210 TXBB_CLK (Ch1) [4] 2 J2212 TXBB_DATA (Ch2) [5] 3 J2902 STROBE (Ch3) [6] <p>The result should look like this:</p>  <p>Figure 21 Settings: Time 1ns/d + 0.3Vpp/d</p>	<p>All OK: replace N7505 NOK : go to BB troubleshooting</p>

ST_CDSP_GSM_TX_POWER_TEST is fatal

This test is checking power amplifier functionality.

Error code	Test	Action
ST_GSM1800_TX_PWR_LOW (0x00, 0x02) ST_GSM850_TX_PWR_LOW (0x00, 0x08) Or combination (0x00, 0x0A)	-	Replace N7520
ST_TXDAC_FAIL (0x00, 0x10) Or combination (0x00, 0x1A), (0x00, 0x12), (0x00, 0x18)	-	Replace N7505

ST_CDSP_TX_PLL_PHASE_LOCK_TEST is fatal

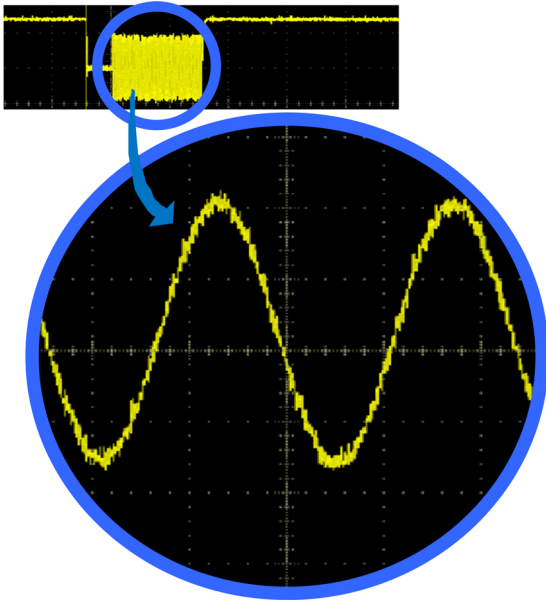
This test is checking if phase lock loop is working.

Error code	Test	Action
ST_TX_PLL_FAIL (0x00, 0x08)		Replace N7505

ST_CDSP_RX_IQ_LOOP_BACK_TEST is fatal

This test is checking the analogue RX communication between baseband and RF.

Error code	Test	Action
ST_FIMRCAL_FAIL (0x00, 0x40) or combination (0x00, 0x50) and (0x00, 0x60)		Replace N7505

Error code	Test	Action
ST_IQ_POWER_TOO_SMALL (0x00, 0x10) ST_IQ_POWER_TOO_HIGH (0x00, 0x20)	<p>In Phoenix: Testing→ GSM→ RF Controls→RX</p> <p>Apply -80dBm signal at 948.06771 MHz</p> <p>Probe during RX operation:</p> <ol style="list-style-type: none"> 1 J2810 RXIP [7] 2 J2811 RXIN [8] 3 J2812 RXQP (Ch1) [9] 4 J2813 RXQN [10] 5 J2814 ADC_ref [11] <p>Check voltage level between 0.7-0.8V</p> <p>The result should look like this:</p>  <p>Figure 22 Frequency ~ 100kHz</p>	<p>All OK : go to BB troubleshooting</p> <p>NOK: replace N7505</p>

ST_CDSP_RF_SUPPLY_TEST is fatal

This test is checking internal voltage regulators.

Error code	Test	Action
ST_VREG_LD02 (0x20, 0x00) ST_VREG_VCCX0 (0x80, 0x00) Or combination (0xA0, 0x00)	<p>Check</p> <ol style="list-style-type: none"> 1 VCCX0 value at testpoint E2909 = 2.4 – 2.6 V [12] 2 VBat = 3.0 – 4.7 V 	<p>All OK: replace N7505</p> <p>NOK : go to power troubleshooting</p>

Receiver troubleshooting

Introduction to receiver (RX) troubleshooting

RX can be tested by making a phone call or in local mode. For the local mode testing, use Phoenix service software.

The main RX troubleshooting measurement is RSSI reading. This test measures the signal strength of the received signal. For GSM RSSI measurements, see *GSM RX chain activation for manual measurements/GSM RSSI measurement*.

GSM RX chain activation for manual measurements/GSM RSSI measurement

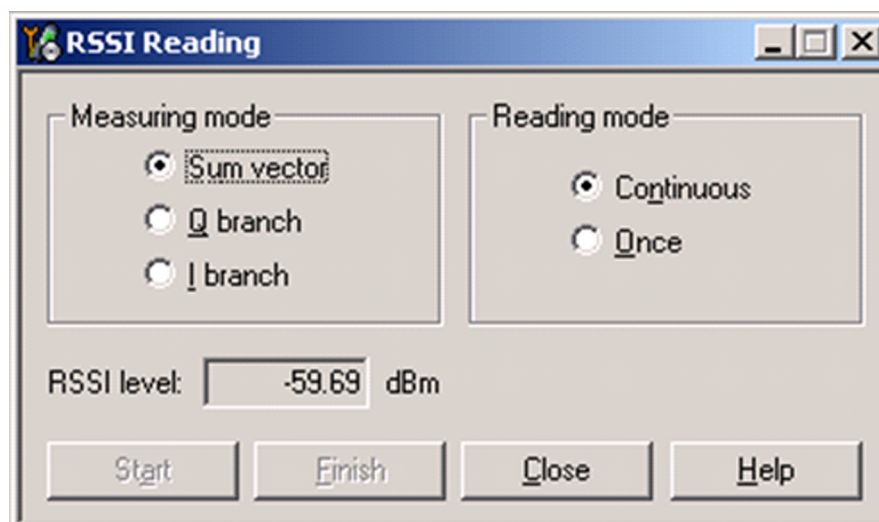
Prerequisites

Make the following settings in Phoenix service software and in the signal generator:

Setting	GSM850	GSM900	GSM1800	GSM1900
Phoenix Channel	190	37	700	661
Signal generator to antenna connector	881.66771 MHz (67.71kHz offset) at -60dBm	942.46771 MHz (67.71kHz offset) at -60dBm	1842.86771 MHz (67.71kHz offset) at -60dBm	1960.06771 MHz (67.71kHz offset) at -60dBm

Steps

1. Set the phone to local mode.
2. Activate RSSI reading in Phoenix (**Testing**→**GSM**→**RSSI reading**)



Results

With the *Measuring mode* set to *Sum vector*, the reading should reflect the level of the signal generator (-losses) +/- 5 dB.

When varying the level in the range -30 to -102 dBm the reading should then follow within +/-5 dB.

Now select the measuring mode to *Q branch* and *I Branch*. In each case the reading should be 3 dB below the signal generator level.

Next actions

RSSI-reading AND TX troubleshooting is failing: replace N7520.

TX is OK and RX is failing: replace N7505.

■ Transmitter troubleshooting

General instructions for transmitter (TX) troubleshooting

Please note the following before performing transmitter tests:

- TX troubleshooting requires TX operation.
- Do not transmit on frequencies that are in use!
- The transmitter can be controlled in local mode for diagnostic purposes.
- The most useful Phoenix tool for GSM transmitter testing is "RF Controls".
- Remember that re-tuning is not a fix! Phones are tuned correctly in production

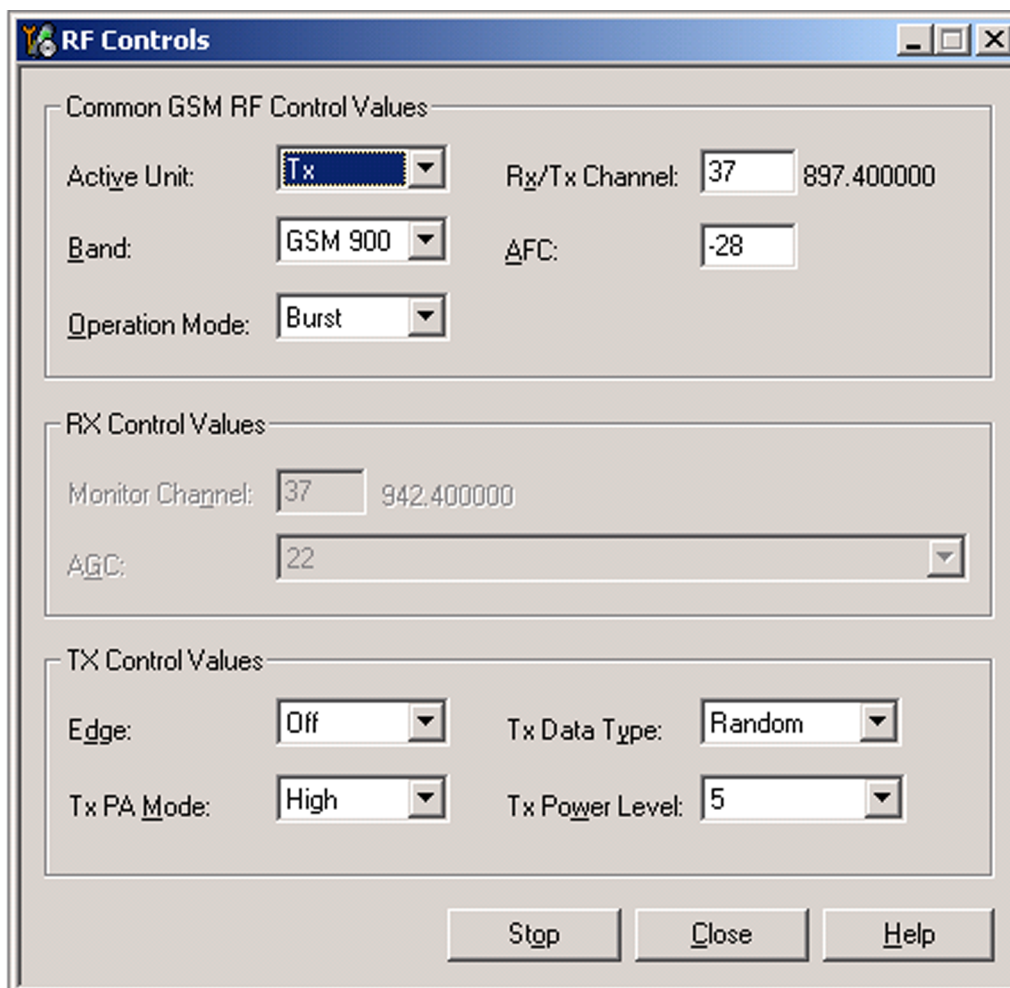
Note: Never activate the GSM transmitter without a proper antenna load. Always connect a 50 Ω load to the RF connector (antenna, RF-measurement equipment or at least a 2 W dummy load); otherwise the power amplifier may be damaged.

GSM transmitter troubleshooting

Steps

1. Set the phone to local mode.
2. Activate RF controls in Phoenix (**Testing**→**GSM**→**Rf Controls**).

Make settings as shown in the picture:



- Check the basic TX parameters (i.e. power, phase error, modulation and switching spectrum), using a communication analyser (for example CMU200).

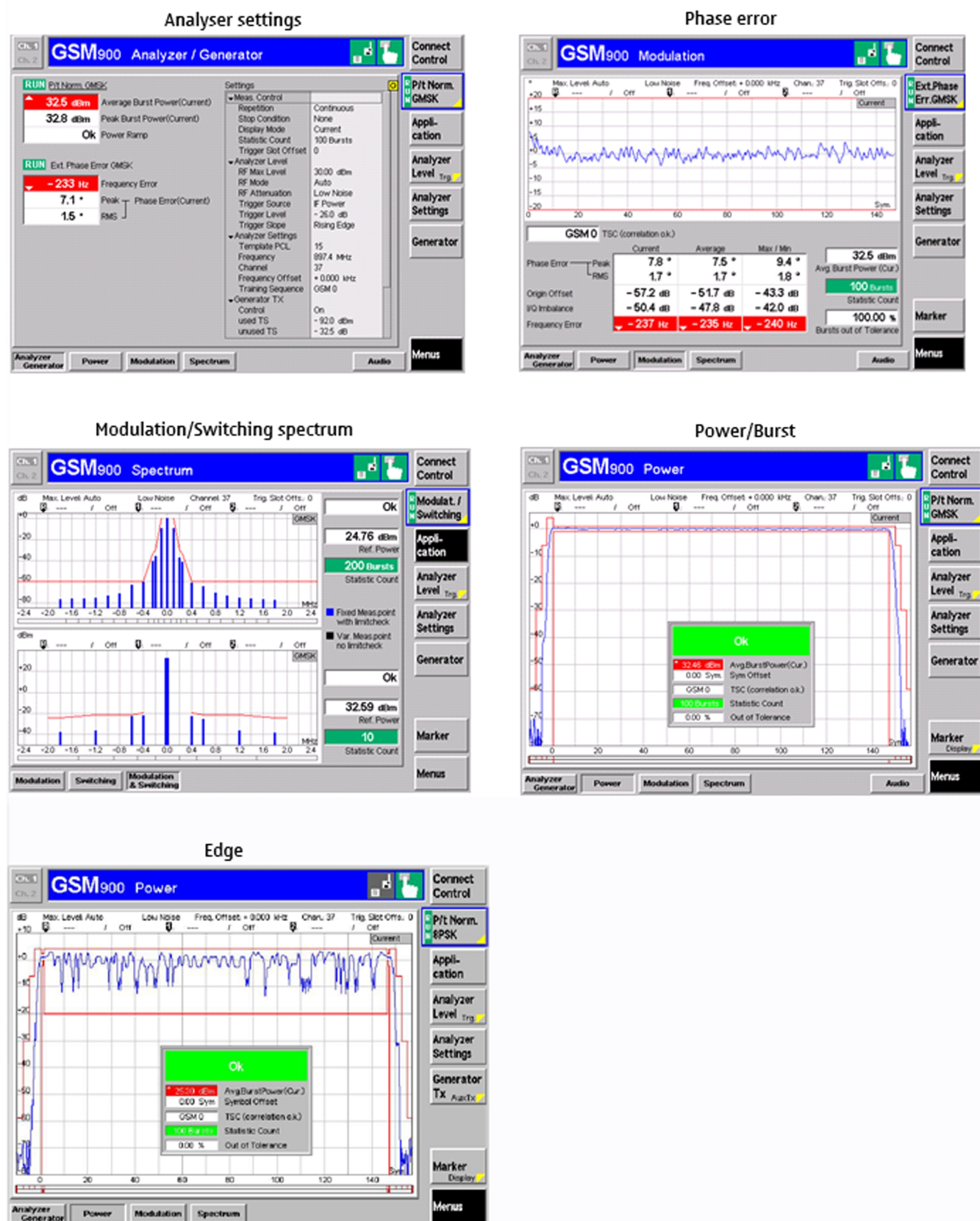


Figure 23 Typical readings

4. Change power level (RF controls) and make sure the power reading follows accordingly.

Next actions

TX is failing and RX is OK: replace N7520

If you want to troubleshoot the other bands, change band with RF controls and set the communication analyzer accordingly.

■ Bluetooth and FM radio troubleshooting

Introduction

The Bluetooth and FM radio receiver and transmitter are combined in the same ASIC, so these features are all checked when troubleshooting (if supported). If the phone does not support the FM transmitter feature there will be no FM TX discrete components or antenna.

Component Placement

The placement of Bluetooth and FM components and test probe points is shown below.

The Bluetooth antenna is product specific (PWB track, SMD antenna, clip on antenna, or antenna integrated into phone covers) and is typically located near the side of the PWB. On phones with WLAN, the Bluetooth RF signal is routed through a WLAN front-end module and a shared Bluetooth / WLAN antenna is used.

The FM receiver RF signal is routed through a product specific FM antenna matching circuit to the phone headset connector. Typically, the FM receiver antenna matching circuit is located near to the phone headset connector. The FM receiver audio signal is routed to the headset connector through the BB ASIC shared by the phone audio functions.

The FM transmitter antenna is product specific and is typically integrated into the phone mechanics (for example a loop antenna integrated into phone covers). The FM transmitter audio input signal is routed from the phone BB section to the Bluetooth-FM ASIC.

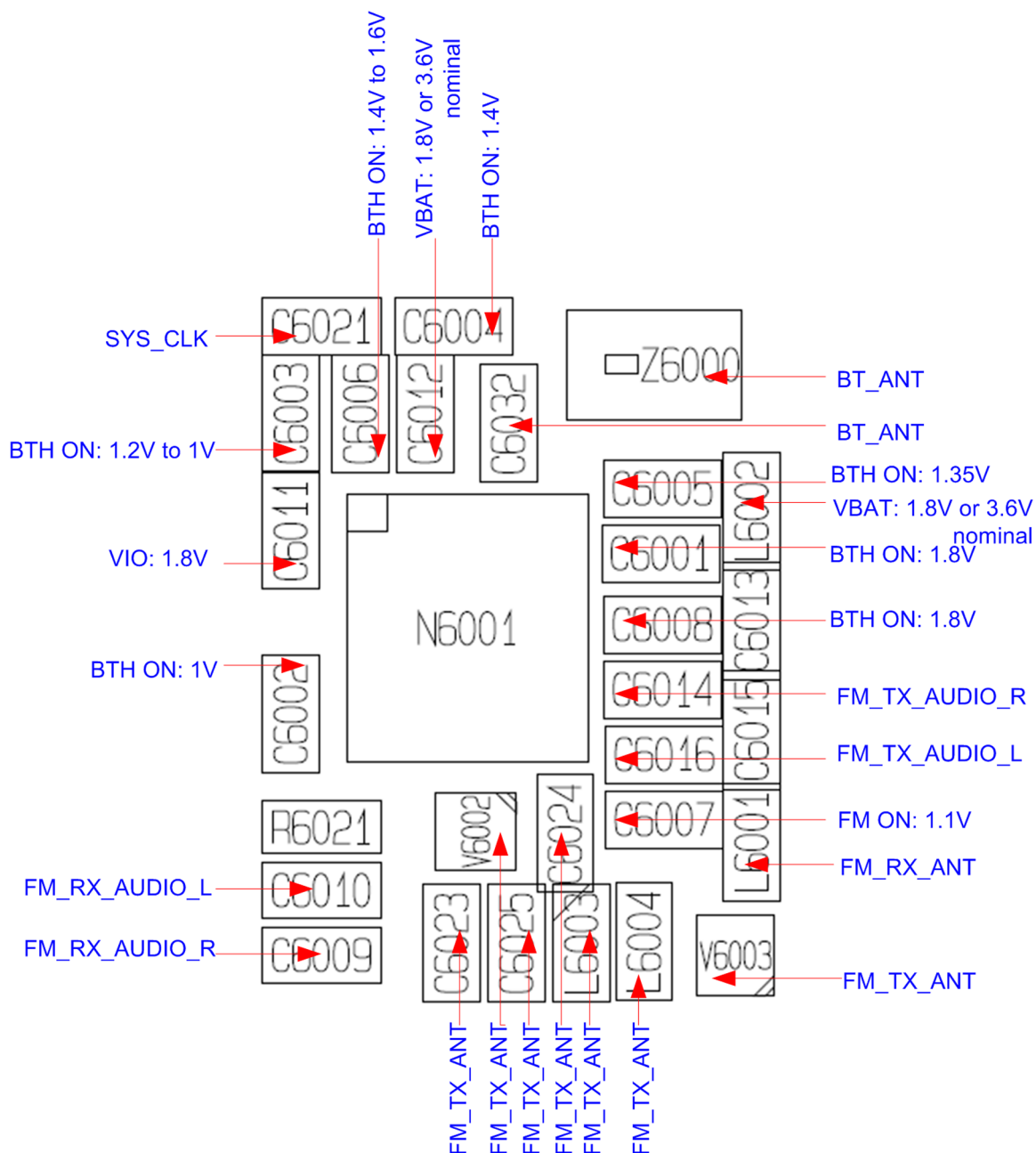


Figure 24 Test points in Bluetooth-FM ASIC circuit – BTHFMTXRDS3.0b (TI BL6450)

Symptom, Problem and Repair Solution

The following problems can occur with the Bluetooth and FM radio hardware:

Symptom	Problem	Repair Solution
Unable to switch on Bluetooth on phone user interface	Open circuit solder joints or component failure of BTH/FM ASIC/module BB ASICs or SMD components.	Replacement of Bluetooth/FM ASIC/module
Able to send data file to another Bluetooth device, but unable to hear audio through functional Bluetooth headset	Open circuit solder joints or component failure of BTH/FM ASIC/module BB ASICs (PCM interface).	Replacement of Bluetooth/FM ASIC/module

Symptom	Problem	Repair Solution
Able to turn switch on Bluetooth on phone user interface, but unable to detect other Bluetooth devices	Open circuit solder joints or detached component in Bluetooth antenna circuit.	Repair of Bluetooth antenna circuit
Problems connecting to specific manufacturer/model Bluetooth accessory (specific Bluetooth profile supported by phone and accessory in product specification)	Possible interoperability issue with accessory fixed in recent Nokia phone software release (check Nokia Service Bulletin for latest information)	Update phone software to latest version if advised in Nokia Service Bulletin. Note: The phone Bluetooth Address and software version are displayed by pressing *#2820# when Bluetooth is on.
Able to turn on FM radio and Bluetooth on phone user interface, but unable to detect local FM radio stations with FM headset inserted	Open circuit solder joints or detached component in FM receiver antenna circuit.	Repair of FM receiver antenna circuit
Able to perform scans to detect local FM radio stations with functional FM headset inserted, but unable to hear FM audio through headset.	Open circuit solder joints or detached component in FM receiver audio path between Bluetooth/FM ASIC and headset.	Repair of FM audio circuit
Able to turn on Bluetooth on phone, but unable to hear audio from FM transmitter through functional external FM radio.	Open circuit solder joints or detached components in FM transmitter circuit / antenna.	Repair of FM transmitter circuit / antenna

Users may experience the following problems resulting in functional phones being returned to the repair centre:

Symptom	Problem	Solution
Bluetooth feature does not operate as desired with another Bluetooth device	Bluetooth Profile implemented in Bluetooth accessory not supported in Nokia phone	Use Bluetooth accessory with Bluetooth profiles supported by phone
Poor FM radio reception (unable to detect many radio stations)	Nokia headset not being used.	Use Nokia headset
Poor FM transmitter range (for example with car radio)	Large path loss between phone FM transmitter antenna and external FM radio aerial (for example FM aerial routing inside car is very well screened or greater than 3 metre distance between phone and FM radio)	Change setup of aerial on FM radio used for listening to audio.

Test Coverage

The tests listed in the table below should be performed to verify whether the Bluetooth and FM receiver and transmitter are functional.

As Bluetooth and FM receiver and transmitter share the same ASIC, all of these functions should be re-tested after repair to the Bluetooth-FM circuit (if supported by the phone).

Test	Test Coverage	Repair solution
Bluetooth Self Test: ST_LPRF_IF_TEST	Bluetooth-FM ASIC UART interface (controls Bluetooth and FM receiver and transmitter)	Replacement of Bluetooth/FM ASIC (or repair of phone BB)
Bluetooth Self Test: ST_BT_WAKEUP_TEST	Bluetooth ASIC interrupt control interface	Replacement of Bluetooth/FM ASIC (or repair of phone BB)
Bluetooth Self Test: ST_LPRF_AUDIO_LINES_TEST	Bluetooth ASIC PCM interface	Replacement of Bluetooth/FM ASIC (or repair of phone BB)
Bluetooth Functional Test: BER test with BT-Box or functional test with other Bluetooth device	Bluetooth antenna circuit	Repair of Bluetooth antenna circuit (including RF filter or WLAN switch if fitted)
FM Radio Functional Test: Perform scan for local radio stations and check station list displayed on phone	FM receiver antenna circuit	Repair of FM antenna circuit (between BTHFM ASIC and headset connector)
FM Radio Functional Test: Listen to local radio station	FM receiver audio circuit	Repair of FM receiver audio circuit (between BTHFM ASIC and headset connector)
FM Transmitter Self Test: ST_FMTX_TEST	FM transmitter ASIC audio interface	Repair of FM transmitter audio circuit (between BTHFM ASIC and phone BB)
FM Transmitter Antenna Test: Read Antenna Tuning Values in Phoenix or functional test transmitting music to nearby radio	FM transmitter antenna circuit and antenna	Replacement of FM transmitter circuit or antenna

The self tests run from Phoenix software are used for fault diagnosis.

If Phoenix software is not available the functional tests with phone accessories are sufficient to verify the functionality Bluetooth and FM radio receiver and transmitter.

If radio reception is poor inside the service centre buildings, the FM receiver can be tested using another FM transmitter device connected to a music player.

If the BTHFM ASIC, FM TX antenna or components between the ASIC and antenna have been replaced the FM transmitter alignment must be performed to ensure that the output complies with ETSI / FCC legal limits.

Test Procedure

Bluetooth and FM Transmitter Self Tests

A flash adapter (or phone data cable) connected to a PC with Phoenix service software is required.

Steps:

- 1 Place the phone in the flash adapter or connect data cable to phone.
- 2 Start Phoenix service software.
- 3 Choose File → Scan Product.

- 4 From the Mode drop-down menu, set to Local.
- 5 Choose Testing → Self Tests.
- 6 In the Self Tests window check the following Bluetooth and FM transmitter tests:
 - ST_LPRF_IF_TEST
 - ST_LPRF_AUDIO_LINES_TEST
 - ST_BT_WAKEUP_TEST
 - ST_FMTX_TEST
- 7 To run the test, click Start.

FM Receiver Self Tests

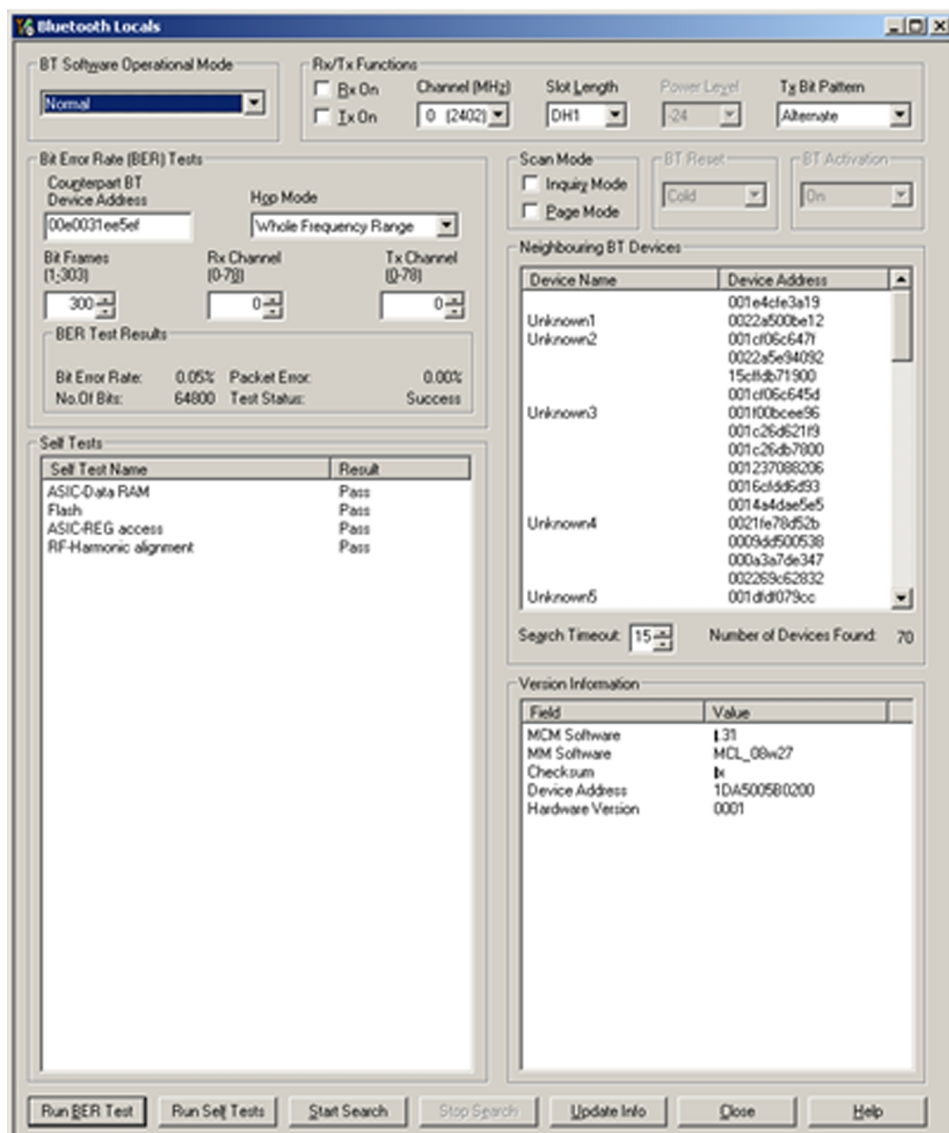
The self test ST_FM_RADIO_TEST used on previous phone designs is not available. As Bluetooth and FM radio share the same control interfaces, FM radio control interfaces are tested using the Bluetooth Self Tests.

Bluetooth BER Test

SB-6 Bluetooth test box (BT-box) is required to perform a BER (Bit Error Rate) test. If a BT-box is not available Bluetooth functionality can be checked by transferring a file to another Bluetooth phone.

Steps:

- 1 Place the phone in the flash adapter or connect data cable to phone.
- 2 Start Phoenix service software.
- 3 Choose File → Scan Product.
- 4 Choose Testing → Bluetooth LOCALS
- 5 Locate the BT-box serial number (12 digits) found in the type label on the back of the SB-6 Bluetooth test box.
- 6 In the Bluetooth LOCALS window, write the 12-digit serial number on the Counterpart BT Device Address line.
- 7 Place the BT-box near (within 10 cm) of the phone and click Run BER Test.



FM Transmitter Antenna Test

The FM transmitter antenna can be checked by reading the 'Antenna Tuning Values' displayed in the FM Transmitter Test display in Phoenix.

Steps:

- 1 Connect data cable to phone including FM transmitter antenna.
- 2 Start Phoenix service software.
- 3 Choose File → Scan Product.
- 4 Choose Testing → FM transmitter Test
- 5 Set the Tx power to 118uV
- 6 Set frequency to near the bottom of the band (90MHz)
- 7 Press 'Read' button and record 'Antenna Tuning Value'
- 8 Set frequency to near the top of the band (103MHz)
- 9 Press 'Read' button and record 'Antenna Tuning Value'

The default value (displayed when there is no antenna present) is 0x00. If both values are 0x00 this indicates there is a faulty antenna, or poor connection between the antenna and BTHFM ASIC.

The test limits for the antenna tuning varactor value are product specific.

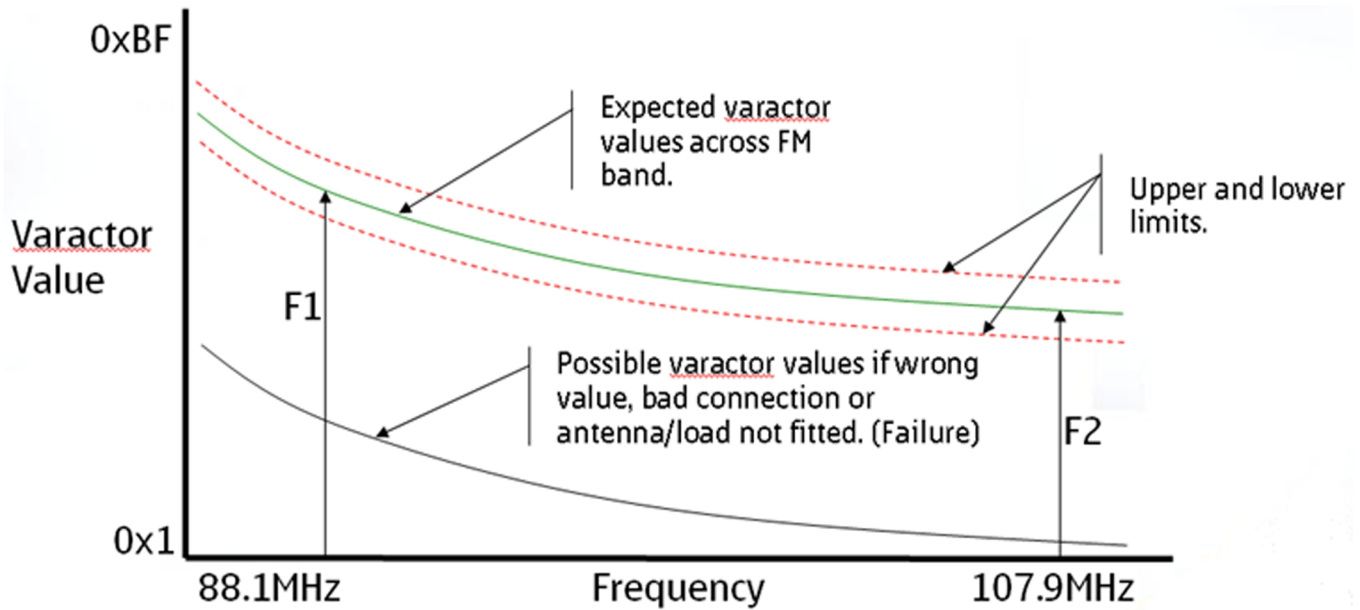
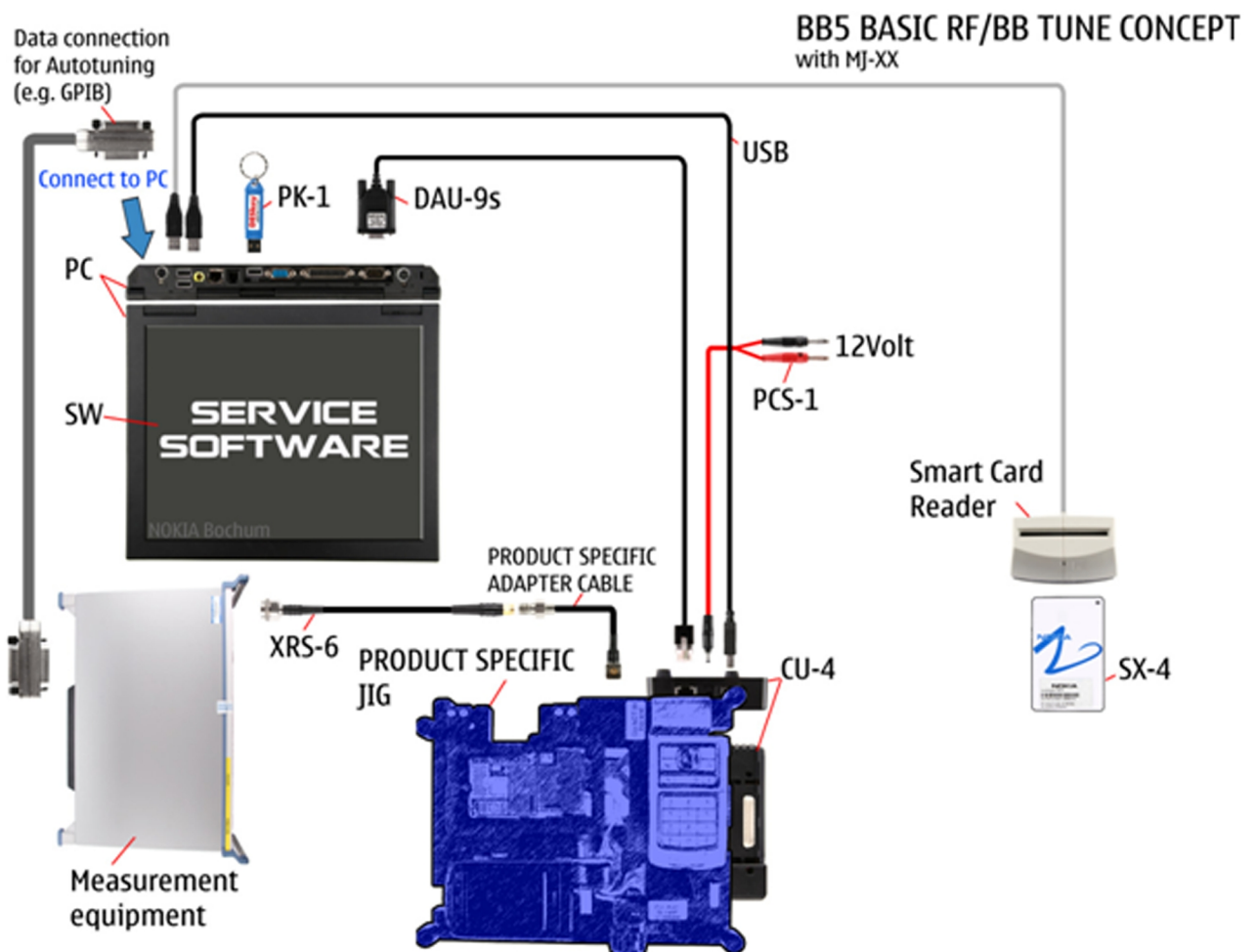


Figure 25 Example of Varactor Tuning values across the FM Band

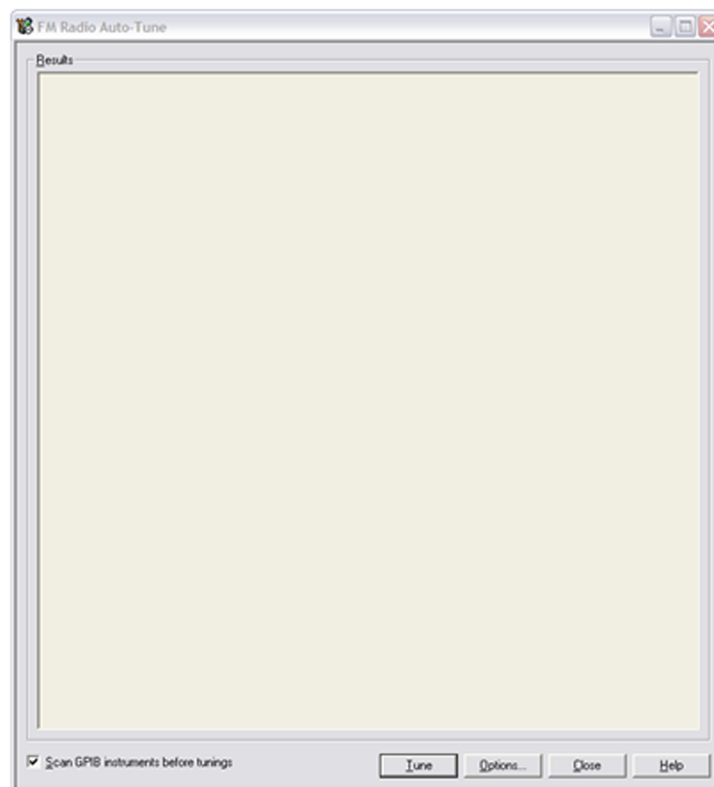
FM transmitter Alignment

The auto-tune test set up with Rhode & Schwarz CMU200 (minimum firmware version 4.10) is shown below:



Steps:

- 1 Insert the phone PWB in the repairman test jig.
- 2 Start Phoenix service software.
- 3 Choose File → Scan Product.
- 4 Choose Tuning → FM Radio Auto-Tune.
- 5 Check that the Scan for Instruments checkbox is enabled and click the Tune button.



If successful then the following dialogue should be displayed:



Bluetooth troubleshooting

Troubleshooting flow

The specific troubleshooting fault repair chart only needs to be followed if there is a fault with a particular function.

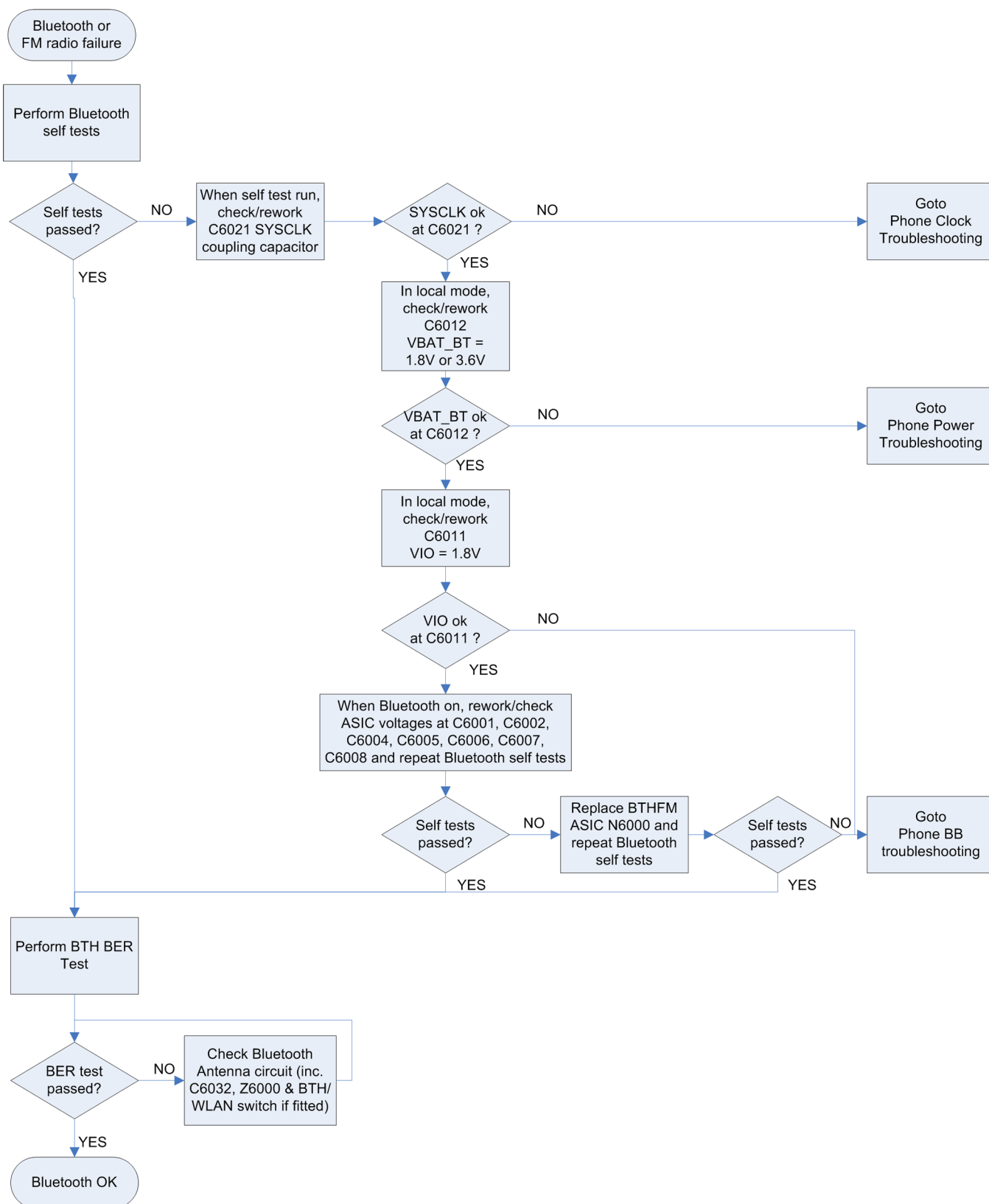
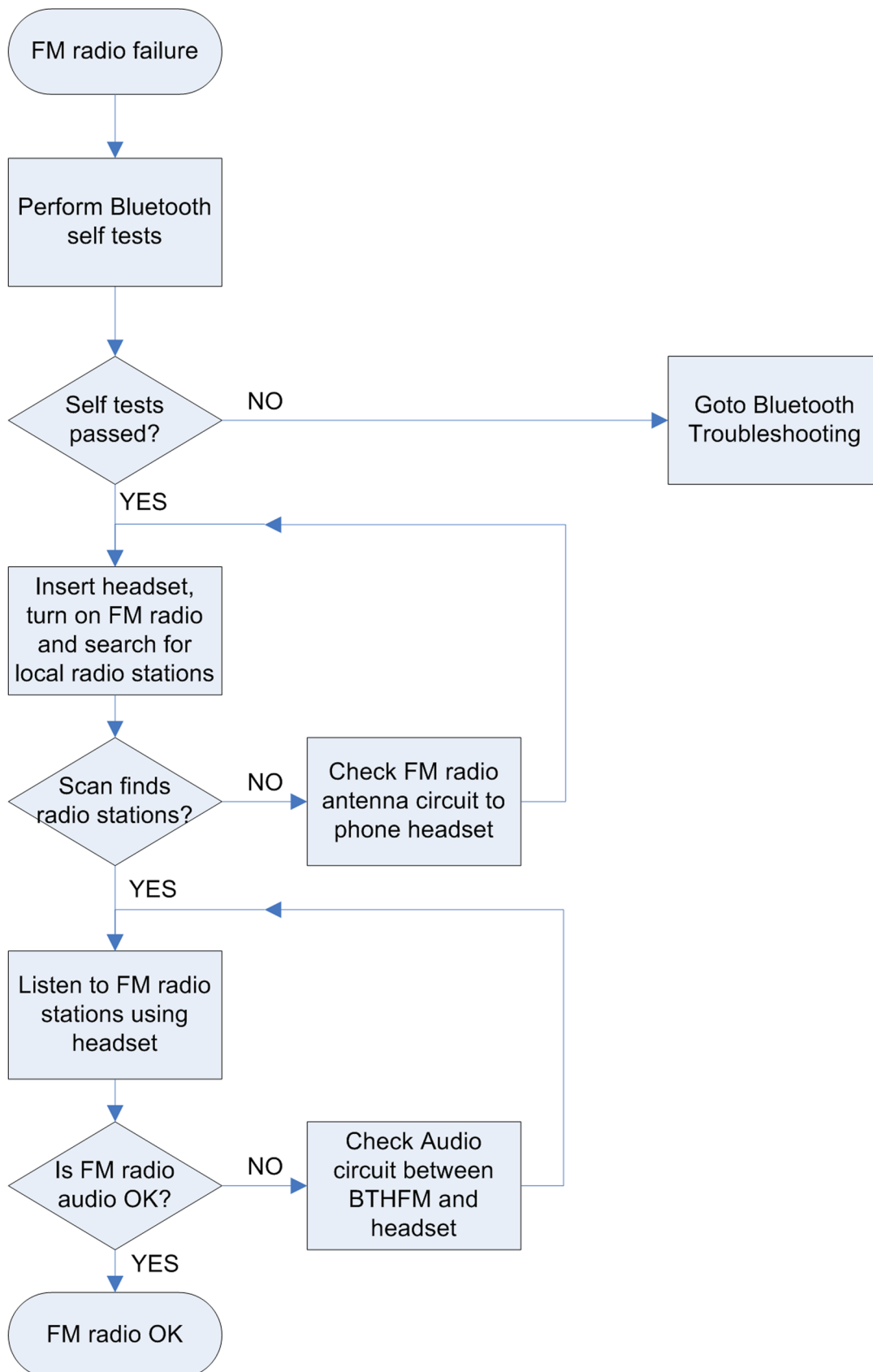


Figure 26 Troubleshooting diagram: Bluetooth

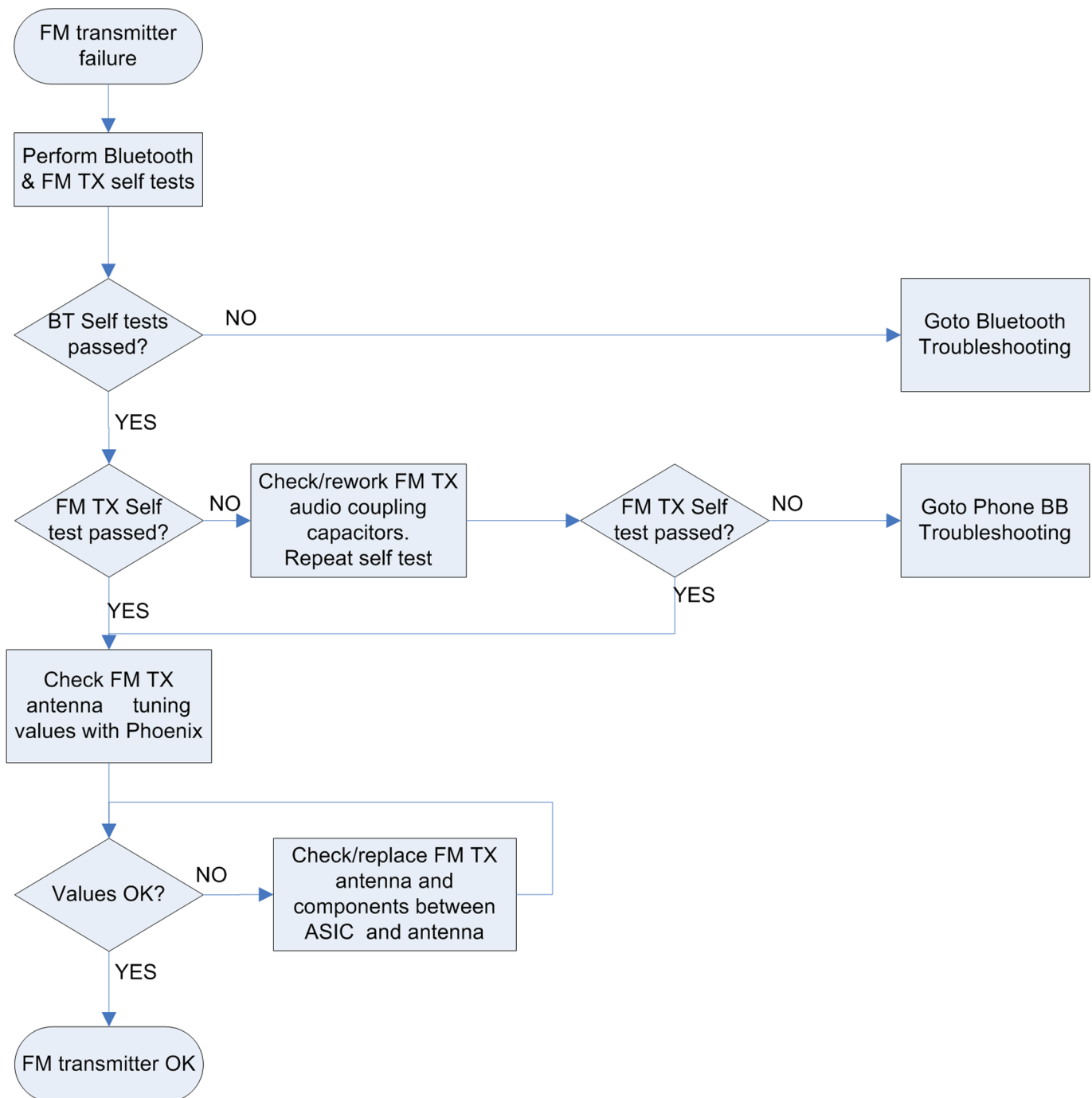
FM receiver troubleshooting

Troubleshooting flow



FM transmitter troubleshooting

Troubleshooting flow



■ WCDMA troubleshooting

WCDMA RX Troubleshooting

Preparations

Set Phoenix to RF local mode WCDMA RX.

Equipment/Setting	Unit
Phoenix	
WCDMA	FDD
RF channel	2140MHz ~10700
Frequency offset	+0.000kHz
Output channel power	-60dBm
	P-sch~ -2dB S-sch~ -2dB P-cc pch~ -2dB DPDch~ -7dB
AGCMod*	Algorithm
Channel*	10700
BB AGC*	0dB
Spectrum analyzer*	
Span	~ 20MHz
Centre frequency	2140MHz
VBW	500kHz
RBW	500kHz
Output channel power	-30dB
RF AH	~ 30dB

Check the following

Check the levels in the steps below.

NO.	Signal Name	Test point
1	RXIP (OUT)	J2810
2	RXQP (OUT)	J2812
3	RXIN (OUT)	J2811
4	RXQN (OUT)	J2813

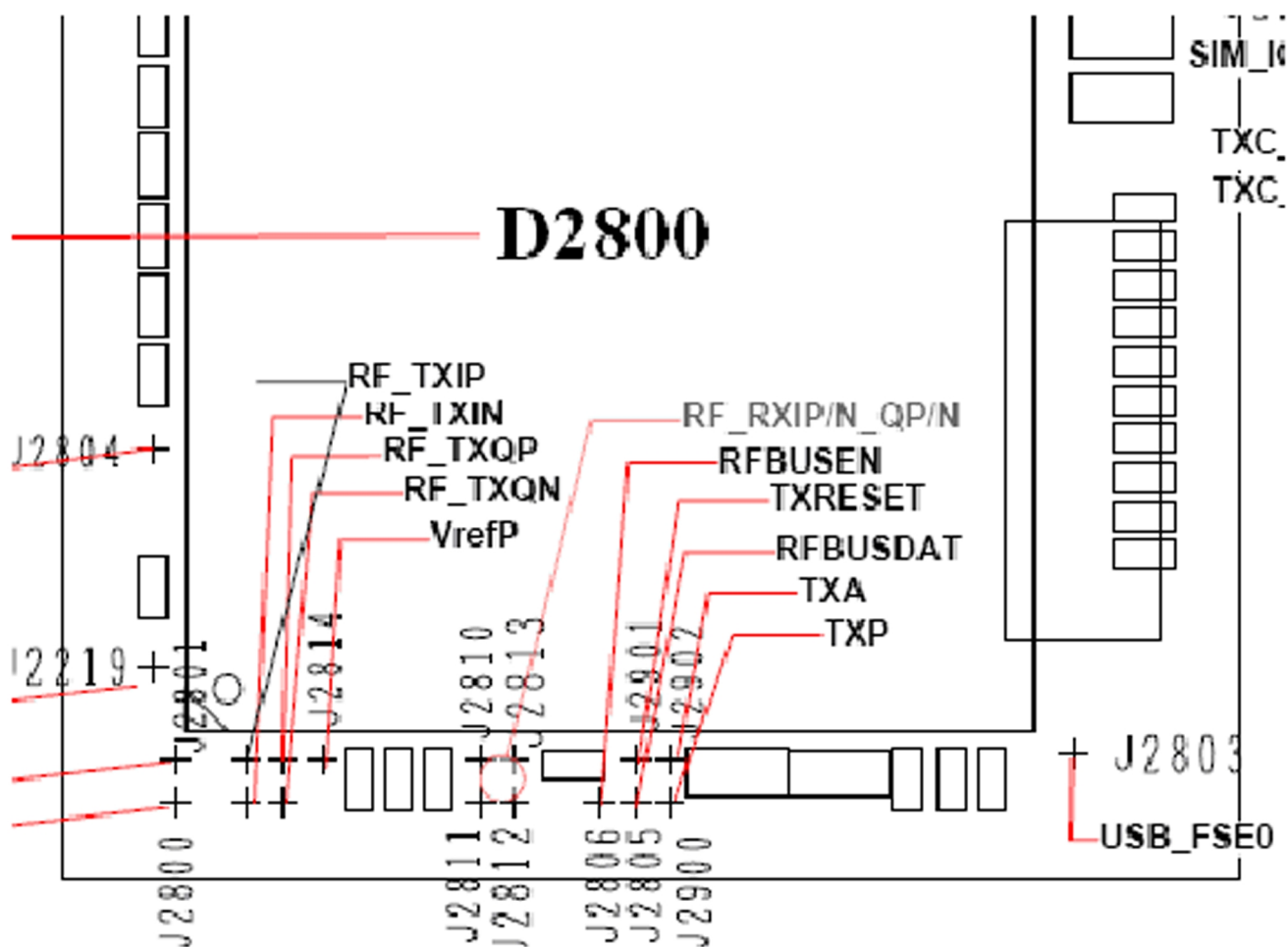


Figure 27 WCDMA RX test points

WCDMA TX Troubleshooting

Preparations

Set Phoenix to RF local mode WCDMA TX.

Check the following

Check the levels in the steps below.

NO.	Signal Name	Test point	Check
1	TXIP	J2815	
2	TXIN	J2816	
3	TXQP	J2818	
4	TXQN	J2817	

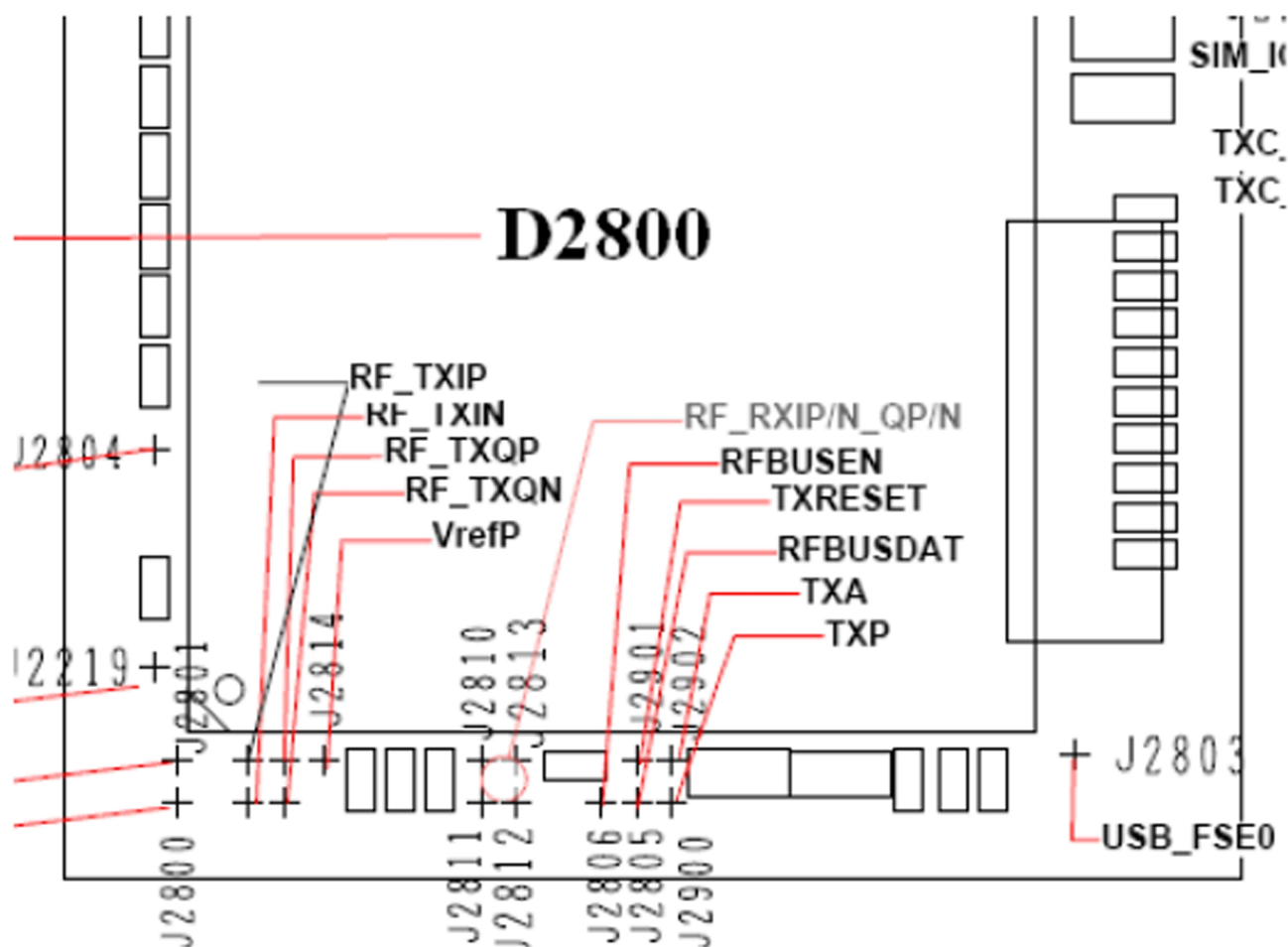


Figure 28 WCDMA TX test points

5 — System Module

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■ Introduction

Phone description

RAP is the main digital baseband ASIC in the phone. It contains functionality for GSM EDGE. The hardware accelerator is used as a camera accelerator.

N2200 (AVILMA) is mainly the audio ASIC in the phone and N2300 (BETTY) is basically the energy management controller for the phone.

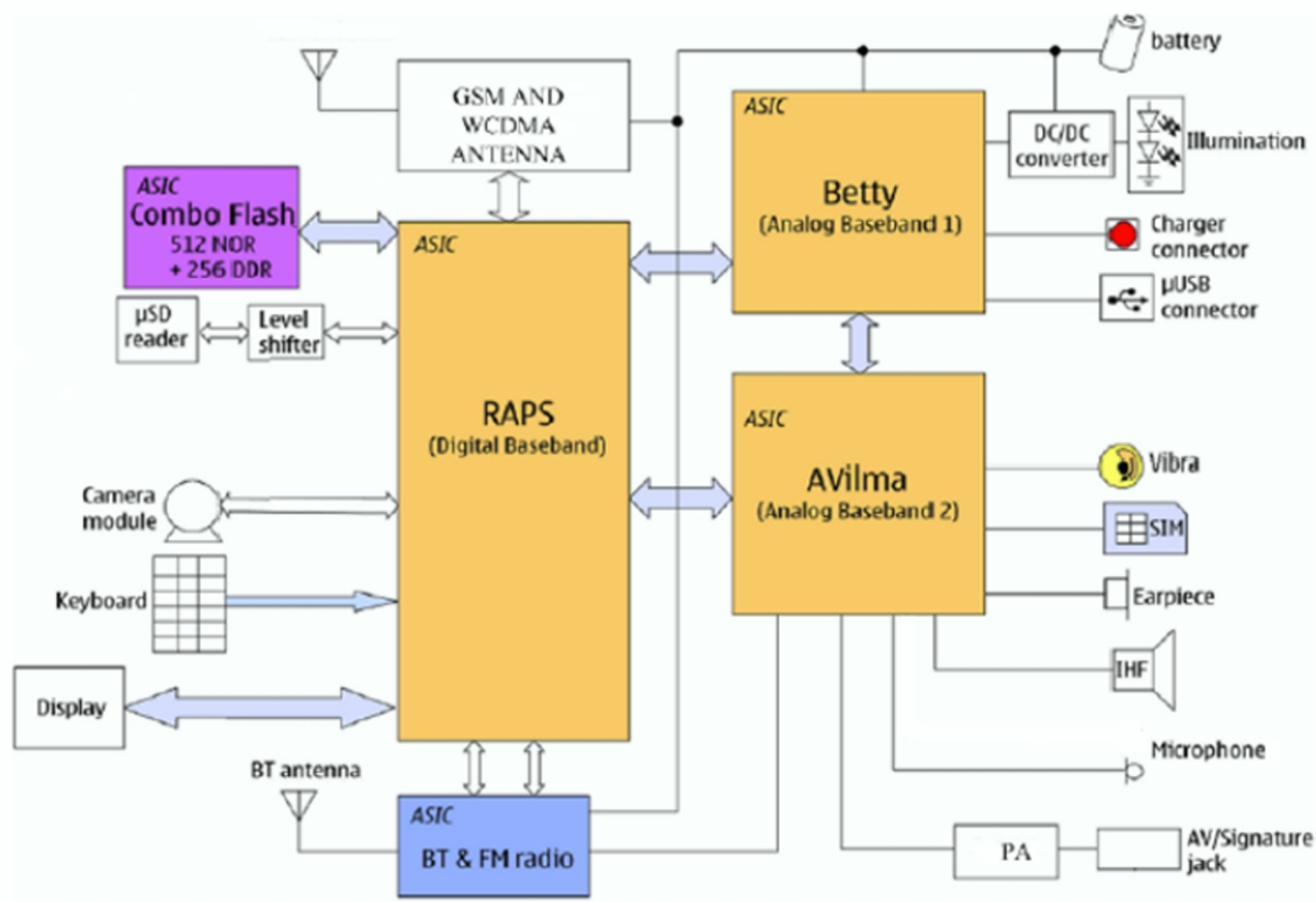
Key components

Function	Description	Item ref
Main board	2ug	
Energy management ASIC	AVILMA BETTY	N2200 N2300
RF ASIC	RF IC	N7505
Processor	RAPS_V3.03-PA	D2800
PA GSM	Front end module (FEM), quad band	N7520
Memory	512 Mbit NOR + 256 Mbit DRAM Combo (Stacked with RAP)	D3000
Bluetooth	BL6450	N6001
Battery	BL-5C 1020mAh	
Battery connector	Lynx interface	X2070
µUSB connector	For data, support USB full speed	AV flex: X2002

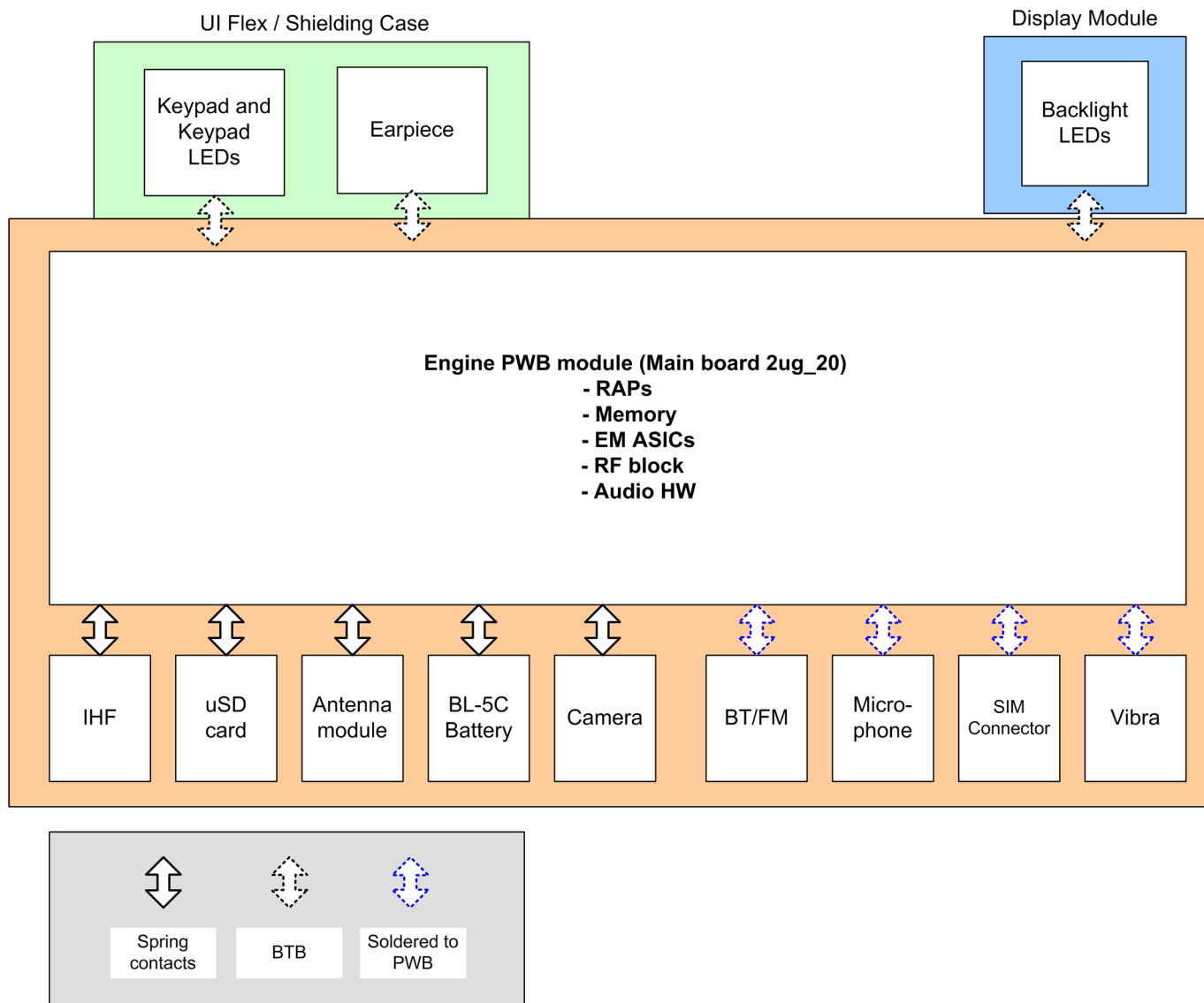
Key component placement



System module block diagram



Board and module connections



■ Energy management

Battery and charging

BL-5C battery

The phone is powered by a 3-pole BL-5C 1020 mAh battery. The three poles are named VBAT, BSI and GND where the BSI line is used to recognize the battery capacity. This is done by means of an internal battery pull down resistor.

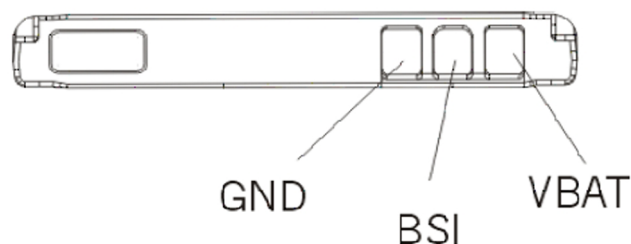


Figure 29 Battery pin order

The battery temperature can be measured from the UI flex.

Battery connector

The battery connector is a blade connector. It has three blades;

- BSI (Battery size indicator)
- GND (Ground)
- VBAT (Battery voltage)

The BSI line is used to recognize the battery capacity by a battery internal pull down resistor.

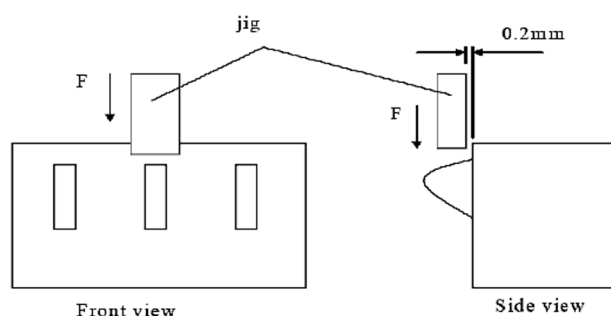


Figure 30 Battery connector

Charging

This phone is charged through a separate charger connector.

Charging is controlled by energy management, and external components are needed to protect the baseband module against EMC, reverse polarity and transient frequency deviation.

Normal and extreme voltages

Energy management is mainly carried out in the two Application Specific Integrated Circuits (ASICs) N2300 BETTY and N2200 AVILMA. These two circuits contains a number of regulators. In addition there are some external regulators too.

In the table below normal and extreme voltages are shown when a BL-5C battery is used.

Table 7 Nominal voltages

Voltage	Voltage [V]	Condition
General Conditions		
Nominal voltage	4.0	
Lower extreme voltage	3.145	

Voltage	Voltage [V]	Condition
Higher extreme voltage (fast charging)	4.230	
HW Shutdown Voltages		
Vmstr+	2.1 ± 0.1	Off to on
Vmstr-	1.9 ± 0.1	On to off
SW Shutdown Voltages		
Sw shutdown	3.106	In call
Sw shutdown	3.2	In idle
Min Operating Voltage		
Vcoff+	2.9 ± 0.1	Off to on
Vcoff-	2.6 ± 0.1	On to off

Power key and system power-up

When the battery is placed in the phone the power key circuits are energized. When the power key is pressed, the system boots up (if an adequate battery voltage is present).

Power down can be initiated by pressing the power key again (the system is powered down with the aid of SW). The power key is connected to EM ASIC N2200 (AVILMA) via PWRONX signal.

Modes of operation

Mode	Description
NO_SUPPLY	(dead) mode means that the main battery is not present or its voltage is too low (below N2200 AVILMA master reset threshold) and that the back-up battery voltage is too low.
BACK_UP	The main battery is not present or its voltage is too low but back-up battery voltage is adequate and the 32 kHz oscillator is running (RTC is on).
PWR_OFF	In this mode (warm), the main battery is present and its voltage is over N2300 BETTY master reset threshold. All regulators are disabled, PurX is on low state, the RTC is on and the oscillator is on. PWR_OFF (cold) mode is almost the same as PWR_OFF (warm), but the RTC and the oscillator are off.
RESET	RESET mode is a synonym for start-up sequence. RESET mode uses 32 kHz clock to count the REST mode delay (typically 16ms).
SLEEP	SLEEP mode is entered only from PWR_ON mode with the aid of SW when the system's activity is low.
FLASHING	FLASHING mode is for SW downloading.

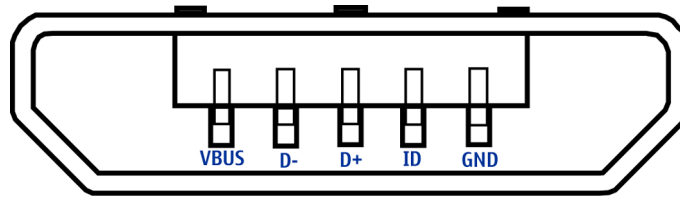
■ USB, SIM, μSD

Micro USB interface

The micro USB (Universal Serial Bus) provides a wired connectivity between a PC and peripheral devices. It is a differential serial bus.

USB 2.0 is supported with full speed (12 Mbps).

Hot swap is supported, which means that USB devices may be plugged in/out at any time. This phone is provided with a specific connector for μ USB.



SIM interface

The device has one SIM (Subscriber Identification Module) interface. It is only accessible if battery is removed. The SIM interface consists of an internal interface between RAP and EM ASIC AVILMA (N2200), and of an external interface between N2200 and SIM contacts.

The SIM IF is shown in the following figure:

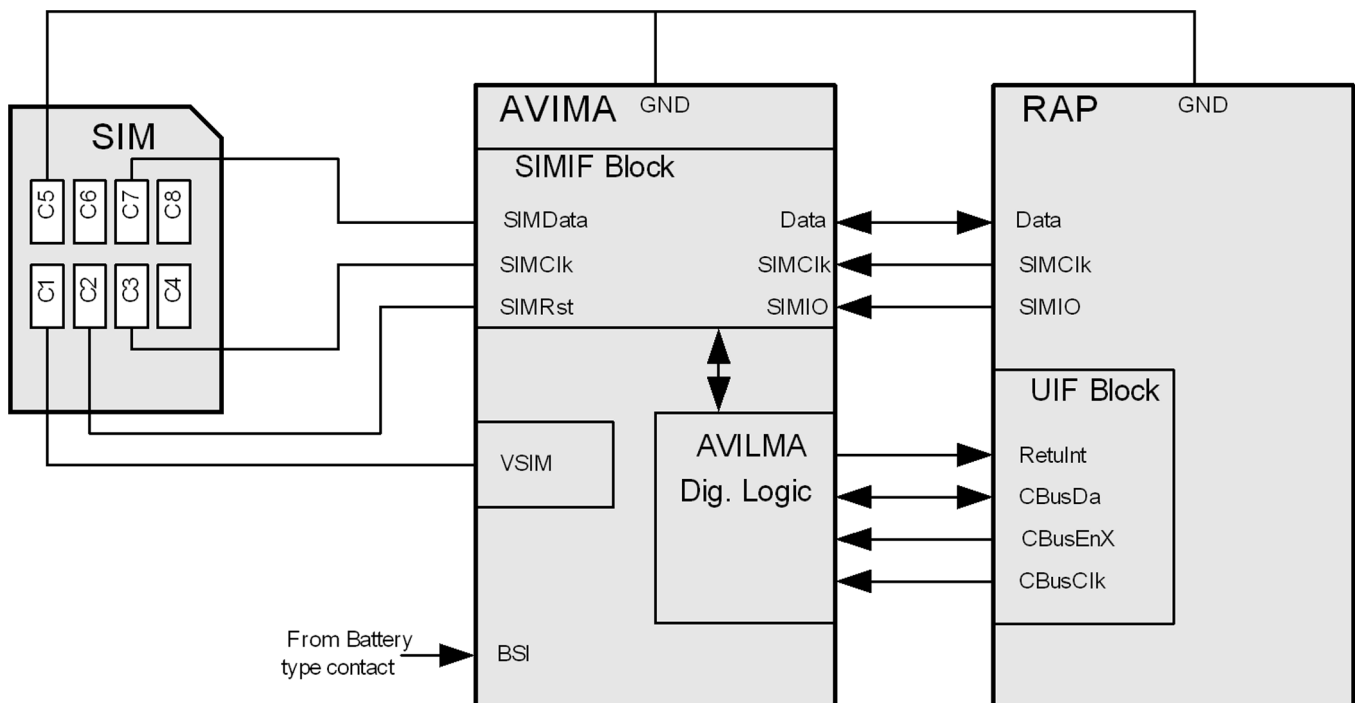
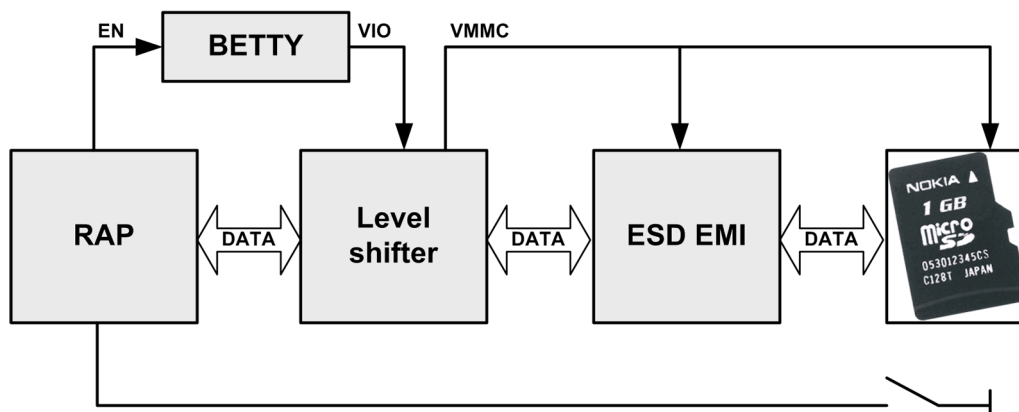


Figure 31 SIM interface

The EM ASIC AVILMA handles the detection of the SIM card. The detection method is based in the BSI line. Because of the location of the SIM card, removing the battery causes a quick power down of the SIM interface. The SIM interface supports both 1.8 V and 3.0 V SIM cards. The SIM interface voltage is first 1.8 V when the SIM card is inserted, and if the card does not response to the ATR a 3 V interface voltage is used.

µSD card interface



The µSD card is connected to the engine by an external level shifter and ESD protection filter. Supplied voltages:

- VMMC: 2.85 V (from level shifter)
- VIO: 1.8 V (from AVILMA)

The card removal is detected by a push detect switch.

■ User interface

Display module

The interconnection between the LCD module and the engine is implemented with a 24-pin board-to-board connector.

The LCD module does not require any tuning in service.

Keyboard

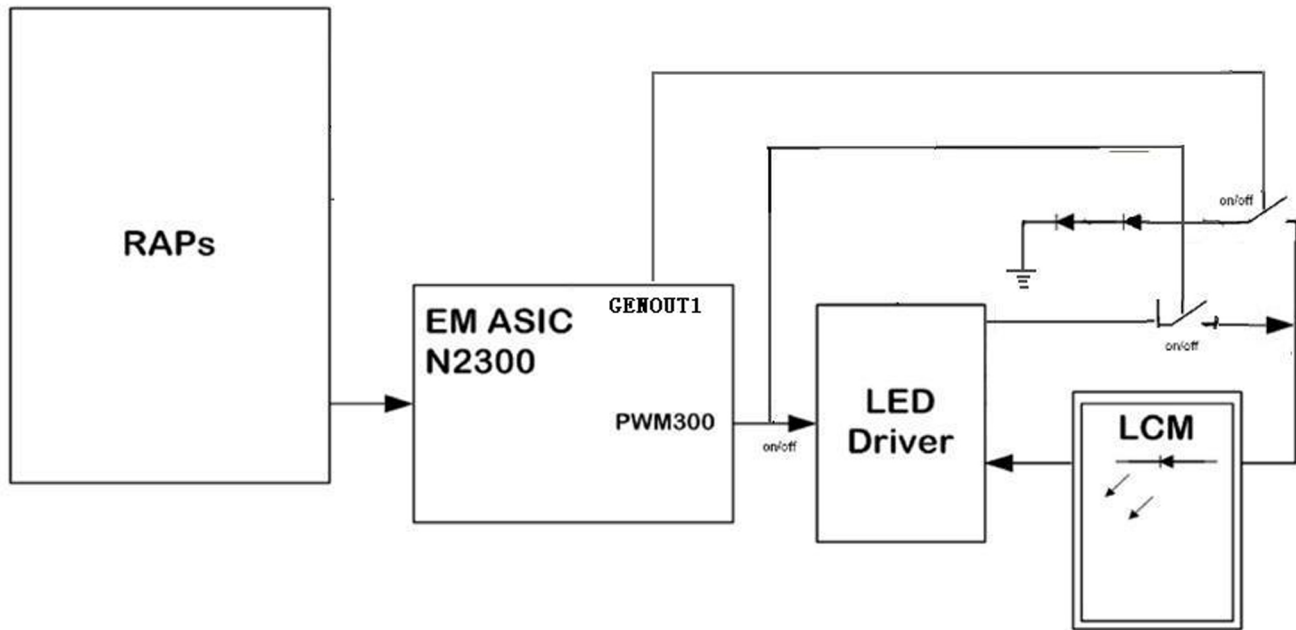
Table 8 Key signal matrix

GENIO	ROW	Col_0 (GENIO-39)	Col_1 (GENIO-40)	Col_2 (GENIO-41)	Col_3 (GENIO-42)
32	ROW0	Left SK	Left	Right SK	Right
33	ROW1	Send	UP	Action	Down
34	ROW2	1	4	7	*
35	ROW3	2	5	8	0
36	ROW4	3	6	9	#

Backlight and illumination

There is backlight illuminating for the display consisting of 2 LEDs.

The keypad is side lit by 2 LEDs with film lightguide.



■ Audio concept

This phone has a conventional solution on microphone, earpiece, IHF and vibrator. All of these are handled by AVILMAS N2200. One integrated handsfree speaker is driven directly by AVILMAS. The analog microphone is directly connected to AVILMAS for processing via a RF-filter.

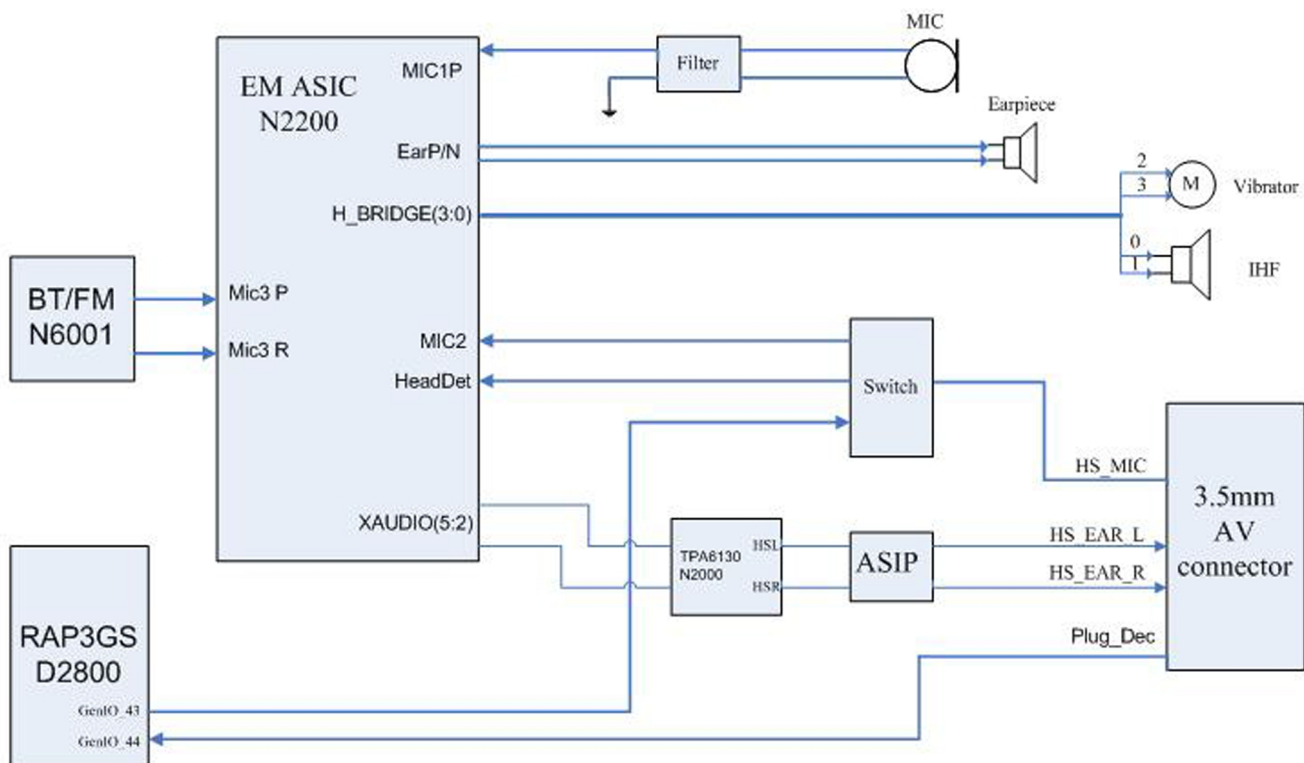


Figure 32 Audio block diagram

The Plug detector (PLUG_DET) in the AV connector enables the external microphone, when the phone function is used.

■ AV connector

The AV connector is used to connect headsets both in the handsfree phone function and for using the phone as a media player (see the audio concept heading). The six pins are used in accordance with the table below.

A connected male connector is detected on pin 6 (PLUG_DET).

Note: Only use an approved cable for connecting to the AV connector (e.g. headset HS-125).

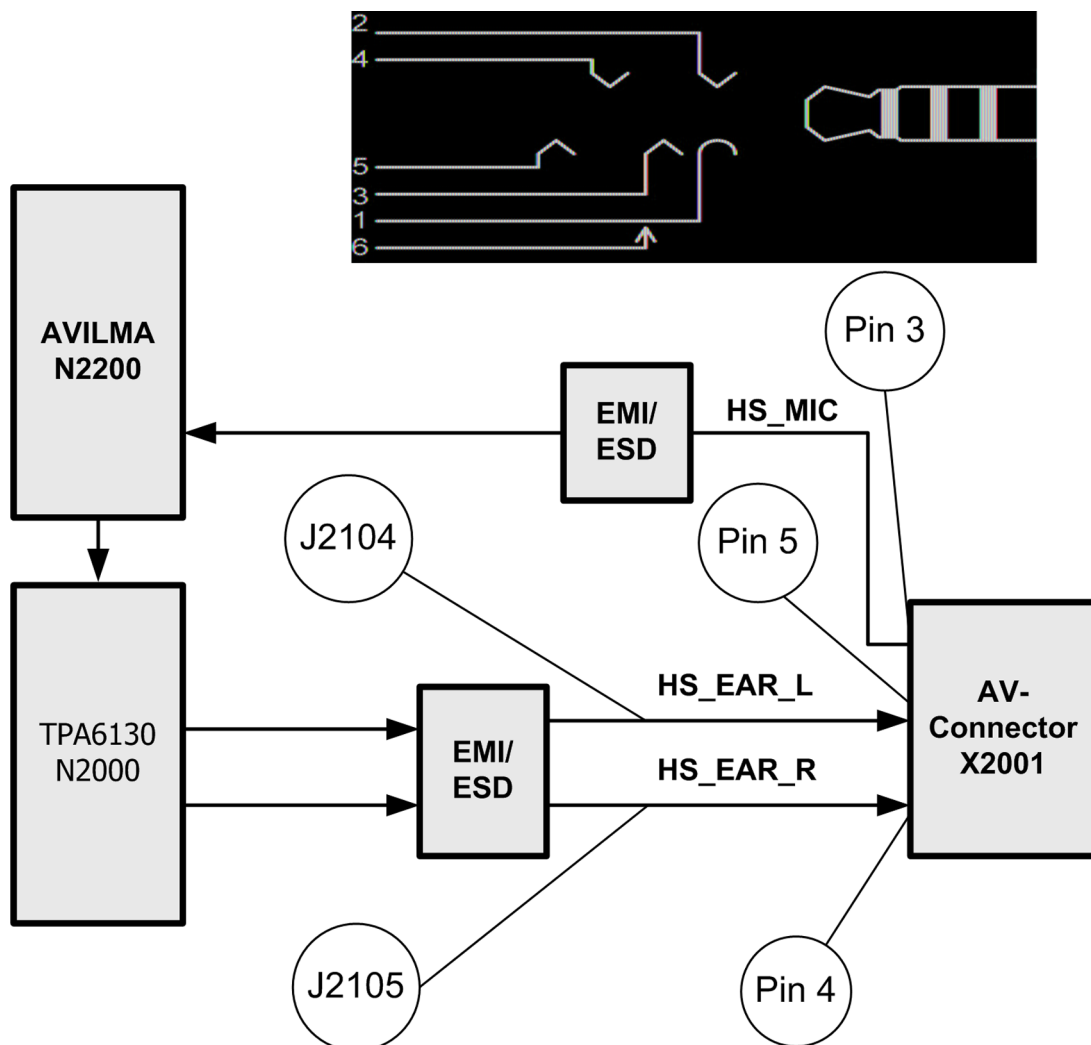


Table 9 AV connector pins

Pin	Signal name	Direction	Description
1, 2	HS_GND	-	Ground
3	HS_MIC	Input	Microphone
4	HS_EAR_R	Output	Audio out
5	HS_EAR_L	Output	Audio out
6	PLUG_DET	Input	Plug detection

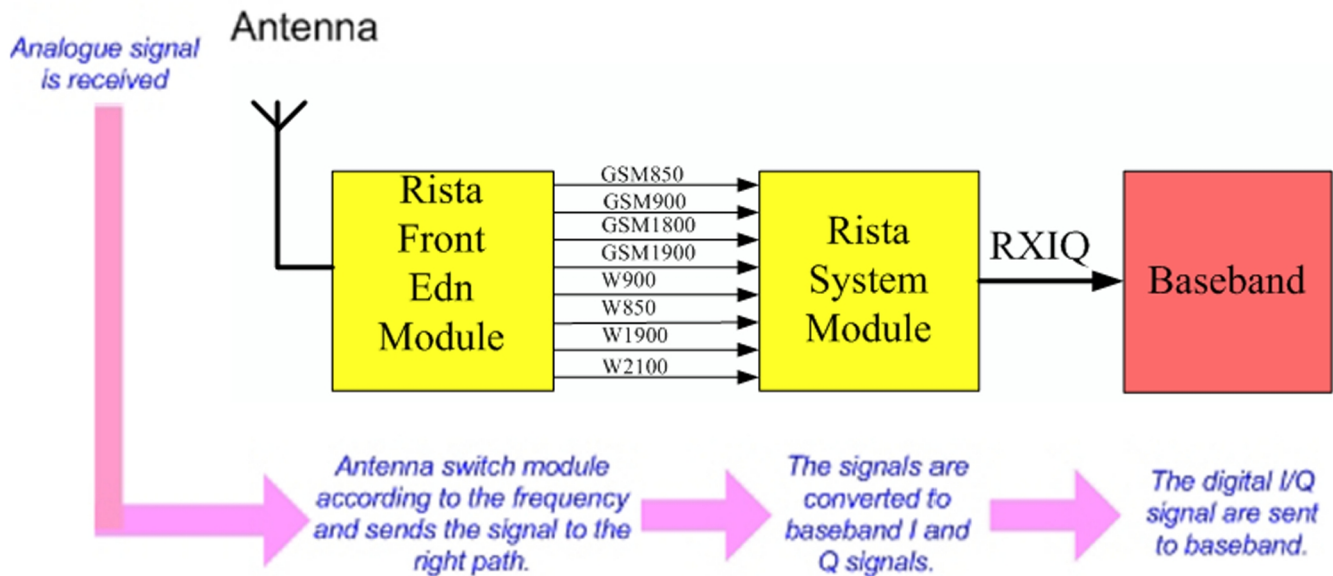
■ RF description

Receiver (RX)

An analogue signal is received by the phone's antenna. The signal is converted to a digital signal and is then transferred further to the baseband (eg. to the earpiece).

The receiver functions are implemented in the RF ASIC.

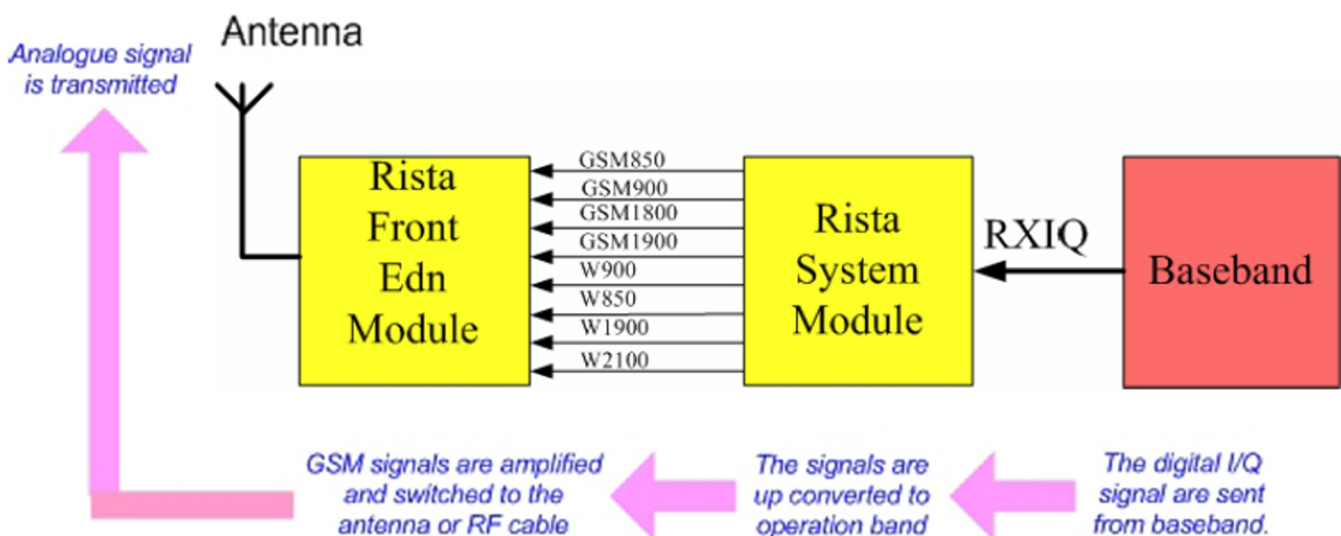
Signals with different frequencies take different paths, therefore being handled by different components.



Transmitter (TX)

The digital baseband signal (eg. from the microphone) is converted to an analogue signal, which is then amplified and transmitted from the antenna. The frequency of this signal can be tuned to match the bandwidth of the system in use (eg. GSM900).

The transmitter functions are implemented in the RF ASIC.



Bluetooth

Bluetooth provides a fully digital link for communication between a master unit (the phone) and one or more slave units (e.g. a wireless headset). Data and control interface for a low power RF module is provided by the module.

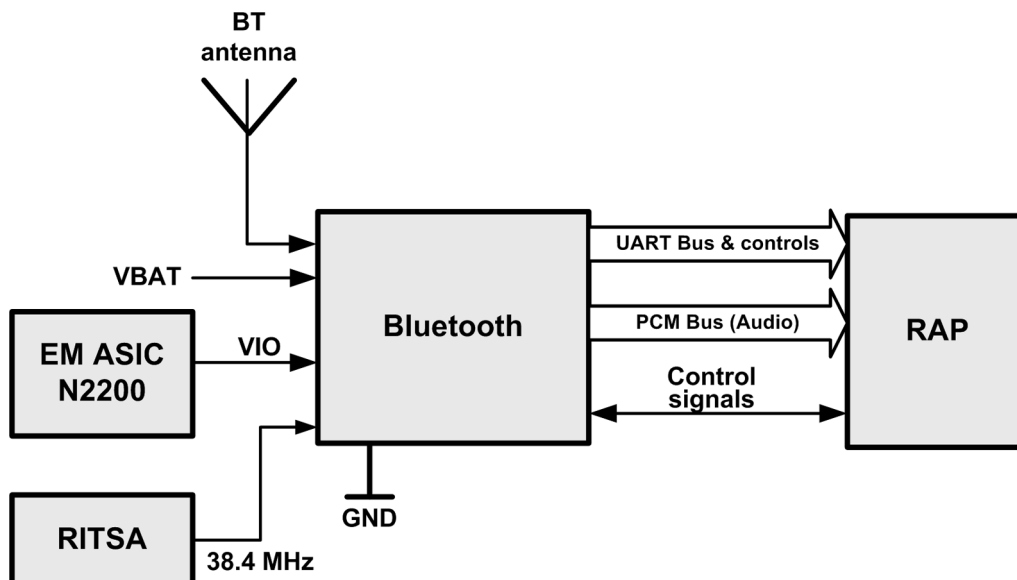


Figure 33 Bluetooth interface

The Bluetooth has a separate built in antenna and is powered by VBAT and the regulated voltage VIO. For audio applications the Bluetooth has a PCM data bus. In addition a UART (universal asynchronous receiver/transmitter) is used for data communication and controls.

■ Technical specifications

Main RF characteristics for GSM band phone

Parameter	Unit
Cellular system	EGSM850/900/1800/1900
RX frequency band	EGSM850: 869- 894 MHz
	EGSM900: 925- 960 MHz
	GSM1800: 1805 - 1880 MHz
	GSM1900: 1930 - 1990 MHz
TX frequency band	GSM850: 824- 849 MHz
	GSM900: 880- 915 MHz
	GSM1800: 1710 - 1785 MHz
	GSM1900: 1850 - 1910 MHz

Parameter	Unit
Output power	GSM850: +5 ... +32.4 dBm
	EGSM900: +5 ... +32.4 dBm
	GSM1800: +0 ... +30.3 dBm
	GSM1900: +0 ... +30.3 dBm
Number of RF channels	GSM850: 124
	EGSM900: 172
	GSM1800: 375
	GSM1900: 300
Channel spacing	GSM 200 KHz
Number of Tx power levels	GSM850: 15
	GSM900: 15
	GSM1800: 16
	GSM1900: 16

Environmental conditions

Environmental condition	Ambient temperature	Notes
Normal operation	-15 °C ... +55 °C	Specifications fulfilled
Reduced performance	55 °C ... +70 °C	Operational only for short periods
Intermittent or no operation	-40 °C ... -15 °C and +70 °C ... +85 °C	Operation not guaranteed but an attempt to operate will not damage the phone
No operation or storage	<-40 °C and >+85 °C	No storage. An attempt to operate may cause permanent damage
Charging allowed	-15 °C ... +55 °C	
Long term storage conditions	0 °C ... +85 °C	
Humidity and water resistance		<p>Relative humidity range is 5 to 95%. Condensed or dripping water may cause intermittent malfunctions. Protection against dripping water has to be implemented in (enclosure) mechanics.</p> <p>Continuous dampness will cause permanent damage to the module.</p>

■ BTHFMTXRDS3.0b Technical Description

BTHFMTXRDS3.0b functional description

Bluetooth and FM radio receiver and transmitter are provided by the same ASIC. The device supports Bluetooth 2.1 + EDR (Enhanced Data Rate) and FM + RDS radio reception in both European/American and Japanese bands (the appropriate region-specific FM radio band is pre-configured in the phone software). The FM transmitter feature allows audio content stored in the phone (such as mp3 files) to be transmitted to a nearby FM radio receiver (such as a car radio). The region-specific channels where FM transmitter operation is permitted are pre-configured in the phone software.

The Bluetooth-FM device UART interface allows the device to communicate with the phone baseband engine using Bluetooth HCI (Host Control Interface) commands. When Bluetooth is switched on, the phone user interface the BT_RESETX line is toggled to reset the Bluetooth device, and commands are sent over the UART interface to configure the device. If UART communication fails (due to a hardware fault) it will not be possible to switch on Bluetooth or the FM radio receiver or transmitter from the phone user interface.

The device has two clock signals: SYS_CLK (19.2MHz, 26.0MHz, or 38.4MHz supported) and SLEEP_CLK (32.768 kHz). The SLEEP_CLK is supplied all the time the phone is switched on. To maximise the phone standby time, it is only necessary to provide a SYS_CLK signal when Bluetooth activity occurs, such as sending Bluetooth data to another device, or checking periodically if there are any other Bluetooth devices attempting to communicate with it. At other times when the Bluetooth device is in standby mode or the FM receiver or transmitter is switched on it is only necessary to provide a SLEEP_CLK signal. The Bluetooth-FM ASIC is powered directly from the phone battery voltage line (VBAT). An internal regulator is enabled when Bluetooth or FM radio is switched on.

Bluetooth audio signals are sent to and from the device using a PCM interface. The Bluetooth RF signal is routed via a buried track to the Bluetooth antenna on the side of the PWB. An RF filter is needed between the Bluetooth antenna and Bluetooth ASIC to prevent interference to and from the cellular phone antenna. Phones that have both Bluetooth and WLAN use a shared antenna, as both services occupy the 2.4GHz ISM frequency band. The co-existence signalling interface between Bluetooth and WLAN ASICs controls the RF activity in the shared frequency band.

The audio signal from the FM radio receiver is routed via the phone Audio ASIC to the phone headset or loudspeaker. The external wired headset is also used as an Antenna for the FM radio receiver. The FM radio receiver RF signal is routed from the ASIC via a buried track to an impedance matching circuit placed near the headset connector.

The audio input signal for the FM radio transmitter is provided by the phone baseband engine. The FM transmitter uses a dedicated internal antenna (generally mounted in the phone mechanics) to radiate the FM signal to a nearby radio receivers. Internal antenna is also used to perform a signal level scan of the FM band to determine potential channels for FM transmission to reduce the effect of interference from other FM transmitters.

Block Diagram

The following block diagram shows how Bluetooth-FM is connected to the host engine.

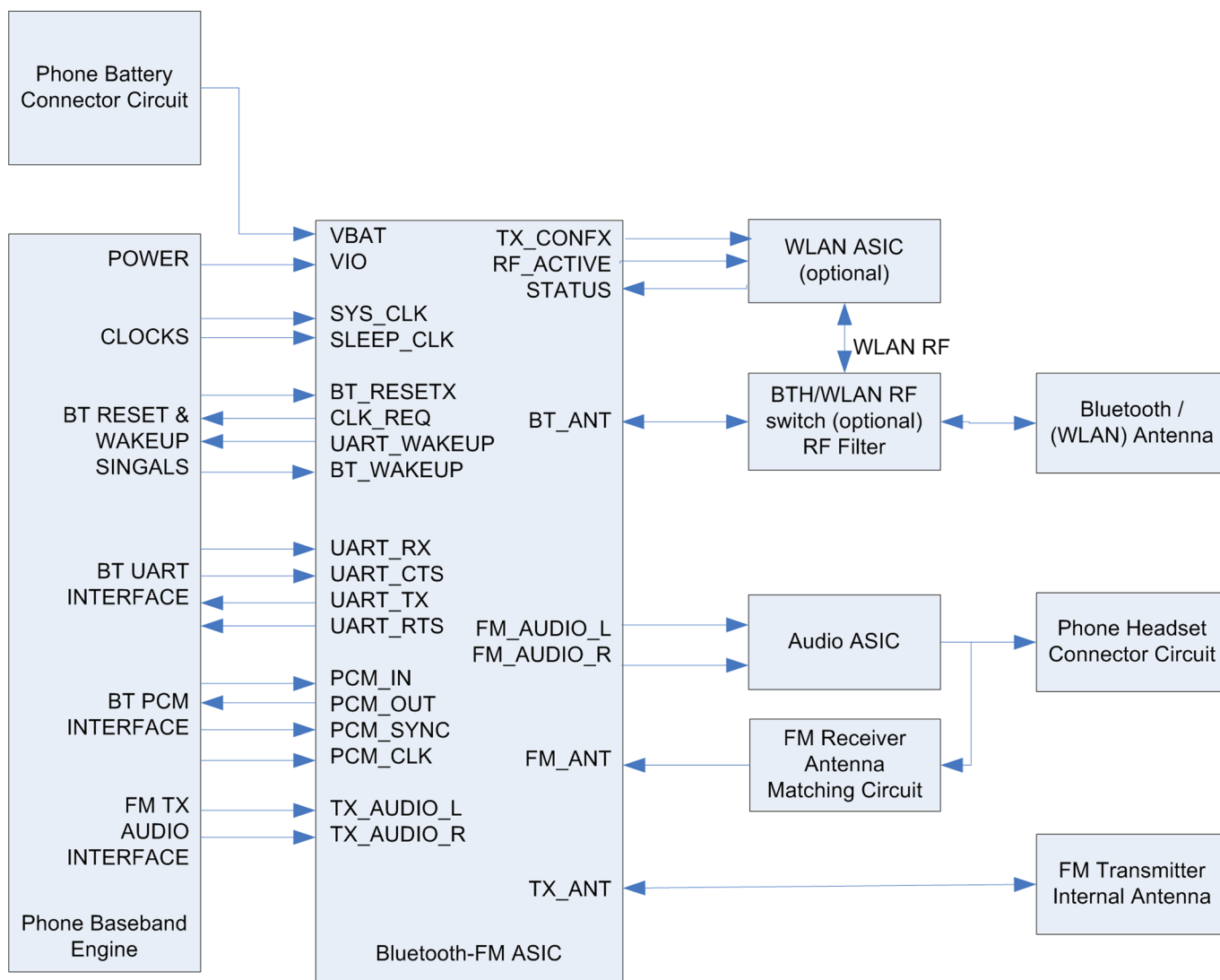


Figure 34 Bluetooth & FM Radio Block Diagram

Interface Signals

Table 10 Bluetooth and FM signal list

Signal Name	I/O	Function	Notes
RF			
BT_ANT	B	Bluetooth Antenna Port	
FM_ANT	I	FM Receiver Antenna Port	
TX_ANT	B	FM Transmitter Antenna Port	
Clocking			
SYS_CLK	I	Cellular engine RF clock (19.2, 26.0 or 38.4MHz)	
SLEEP_CLK	I	Cellular engine sleep clock (32.768kHz)	
Bluetooth & FM Control			

BT_RESETX	I	Bluetooth ASIC reset	
CLK_REQ	0	Signal from Bluetooth ASIC to indicate that SYSCLK is required	
UART_WAKEUP	0	Signal from Bluetooth ASIC to wakeup host engine	
BT_WAKEUP	I	Signal from host engine to wakeup Bluetooth ASIC	
Bluetooth & FM Communication			
UART_RX	I	UART interface to/from host engine	
UART_CTS	I		
UART_TX	0		
UART_RTS	0		
Bluetooth Audio Interface			
PCM_IN	I	PCM interface to/from host engine	
PCM_OUT	0		
PCM_SYNC	I		
PCM_CLK	I		
FM Radio Audio Interface			
FM_AUDIO_L	0	FM Receiver Analog Audio Output – Left Channel	Alternative I2S digital interface could be used
FM_AUDIO_R	0	FM Receiver Analog Audio Output – Right Channel	
TX_AUDIO_L	I	FM Transmitter Analog Audio Output – Left Channel	
TX_AUDIO_R	I	FM Transmitter Analog Audio Output – Right Channel	
Bluetooth – WLAN Coexistence Interface			
TX_CONFX	I	Control signal from WLAN to facilitate Bluetooth	Only used on WLAN phones
RF_ACTIVE	0	Control signal to WLAN to indicate Bluetooth RF activity	
STATUS	0	Control signal to WLAN to indicate Bluetooth status	
Power			
VIO	P	Cellular engine I/O supply	Alternative connection to 1.8V supply could be used
VBAT	P	Phone battery power	

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Nokia Customer Care

Glossary

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A/D-converter	Analogue-to-digital converter
ACI	Accessory Control Interface
ADC	Analogue-to-digital converter
ADSP	Application DPS (expected to run high level tasks)
AGC	Automatic gain control (maintains volume)
ALS	Ambient light sensor
AMSL	After Market Service Leader
ARM	Advanced RISC Machines
ARPU	Average revenue per user (per month or per year)
ASIC	Application Specific Integrated Circuit
ASIP	Application Specific Interface Protector
B2B	Board to board, connector between PWB and UI board
BA	Board Assembly
BB	Baseband
BC02	Bluetooth module made by CSR
BIQUAD	Bi-quadratic (type of filter function)
BSI	Battery Size Indicator
BT	Bluetooth
CBus	MCU controlled serial bus connected to UPP_WD2, UEME and Zocus
CCP	Compact Camera Port
CDMA	Code division multiple access
CDSP	Cellular DSP (expected to run at low levels)
CLDC	Connected limited device configuration
CMOS	Complimentary metal-oxide semiconductor circuit (low power consumption)
COF	Chip on Foil
COG	Chip on Glass
CPU	Central Processing Unit
CSD	Circuit-switched data
CSR	Cambridge silicon radio
CSTN	Colour Super Twisted Nematic
CTSI	Clock Timing Sleep and interrupt block of Tiku
CW	Continuous wave
D/A-converter	Digital-to-analogue converter
DAC	Digital-to-analogue converter
DBI	Digital Battery Interface
DBus	DSP controlled serial bus connected between UPP_WD2 and Helgo

DCT-4	Digital Core Technology
DMA	Direct memory access
DP	Data Package
DPLL	Digital Phase Locked Loop
DSP	Digital Signal Processor
DTM	Dual Transfer Mode
DtoS	Differential to Single ended
EDGE	Enhanced data rates for global/GSM evolution
EGSM	Extended GSM
EM	Energy management
EMC	Electromagnetic compatibility
EMI	Electromagnetic interference
ESD	Electrostatic discharge
FCI	Functional cover interface
FM	Frequency Modulation
FPS	Flash Programming Tool
FR	Full rate
FSTN	Film compensated super twisted nematic
GMSK	Gaussian Minimum Shift Keying
GND	Ground, conductive mass
GPIO	General-purpose interface bus
GPRS	General Packet Radio Service
GSM	Group Special Mobile/Global System for Mobile communication
HSDPA	High-speed downlink packet access
HF	Hands free
HFCM	Handsfree Common
HS	Handset
HSCSD	High speed circuit switched data (data transmission connection faster than GSM)
HW	Hardware
I/O	Input/Output
IBAT	Battery current
IC	Integrated circuit
ICHR	Charger current
IF	Interface
IHF	Integrated hands free
IMEI	International Mobile Equipment Identity

IR	Infrared
IrDA	Infrared Data Association
ISA	Intelligent software architecture
JPEG/JPG	Joint Photographic Experts Group
LCD	Liquid Crystal Display
LDO	Low Drop Out
LED	Light-emitting diode
LPRF	Low Power Radio Frequency
MCU	Micro Controller Unit (microprocessor)
MCU	Multiport control unit
MIC, mic	Microphone
MIDP	Mobile Information Device Profile
MIN	Mobile identification number
MIPS	Million instructions per second
MMC	Multimedia card
MMS	Multimedia messaging service
MP3	Compressed audio file format developed by Moving Picture Experts Group
MTP	Multipoint-to-point connection
NFC	Near field communication
NTC	Negative temperature coefficient, temperature sensitive resistor used as a temperature sensor
OMA	Object management architecture
OMAP	Operations, maintenance, and administration part
Opamp	Operational Amplifier
PA	Power amplifier
PCM	Pulse Code Modulation
PDA	Pocket Data Application
PDA	Personal digital assistant
PDRAM	Program/Data RAM (on chip in Tiku)
Phoenix	Software tool of DCT4.x and BB5
PIM	Personal Information Management
PLL	Phase locked loop
PM	(Phone) Permanent memory
PUP	General Purpose IO (PIO), USARTS and Pulse Width Modulators
PURX	Power-up reset
PWB	Printed Wiring Board

PWM	Pulse width modulation
RC-filter	Resistance-Capacitance filter
RDS	Radio Data Service
RF	Radio Frequency
RF PopPort™	Reduced function PopPort™ interface
RFBUS	Serial control Bus For RF
RSK	Right Soft Key
RS-MMC	Reduced size Multimedia Card
RSS	Web content Syndication Format
RSSI	Receiving signal strength indicator
RST	Reset Switch
RTC	Real Time Clock (provides date and time)
RX	Radio Receiver
SARAM	Single Access RAM
SAW filter	Surface Acoustic Wave filter
SDRAM	Synchronous Dynamic Random Access Memory
SID	Security ID
SIM	Subscriber Identity Module
SMPS	Switched Mode Power Supply
SNR	Signal-to-noise ratio
SPR	Standard Product requirements
SRAM	Static random access memory
STI	Serial Trace Interface
SW	Software
SWIM	Subscriber/Wallet Identification Module
TCP/IP	Transmission control protocol/Internet protocol
TCXO	Temperature controlled Oscillator
Tiku	Finnish for Chip, Successor of the UPP
TX	Radio Transmitter
UART	Universal asynchronous receiver/transmitter
UEME	Universal Energy Management chip (Enhanced version)
UEMEK	See UEME
UI	User Interface
UPnP	Universal Plug and Play
UPP	Universal Phone Processor
UPP_WD2	Communicator version of DCT4 system ASIC

USB	Universal Serial Bus
VBAT	Battery voltage
VCHAR	Charger voltage
VCO	Voltage controlled oscillator
VCTCXO	Voltage Controlled Temperature Compensated Crystal Oscillator
VCXO	Voltage Controlled Crystal Oscillator
VF	View Finder
Vp-p	Peak-to-peak voltage
VSIM	SIM voltage
WAP	Wireless application protocol
WCDMA	Wideband code division multiple access
WD	Watchdog
WLAN	Wireless local area network
XHTML	Extensible hypertext markup language
Zocus	Current sensor (used to monitor the current flow to and from the battery)

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